OCTOBER 17, 1931

Railway Age

FOUNDED IN 1856

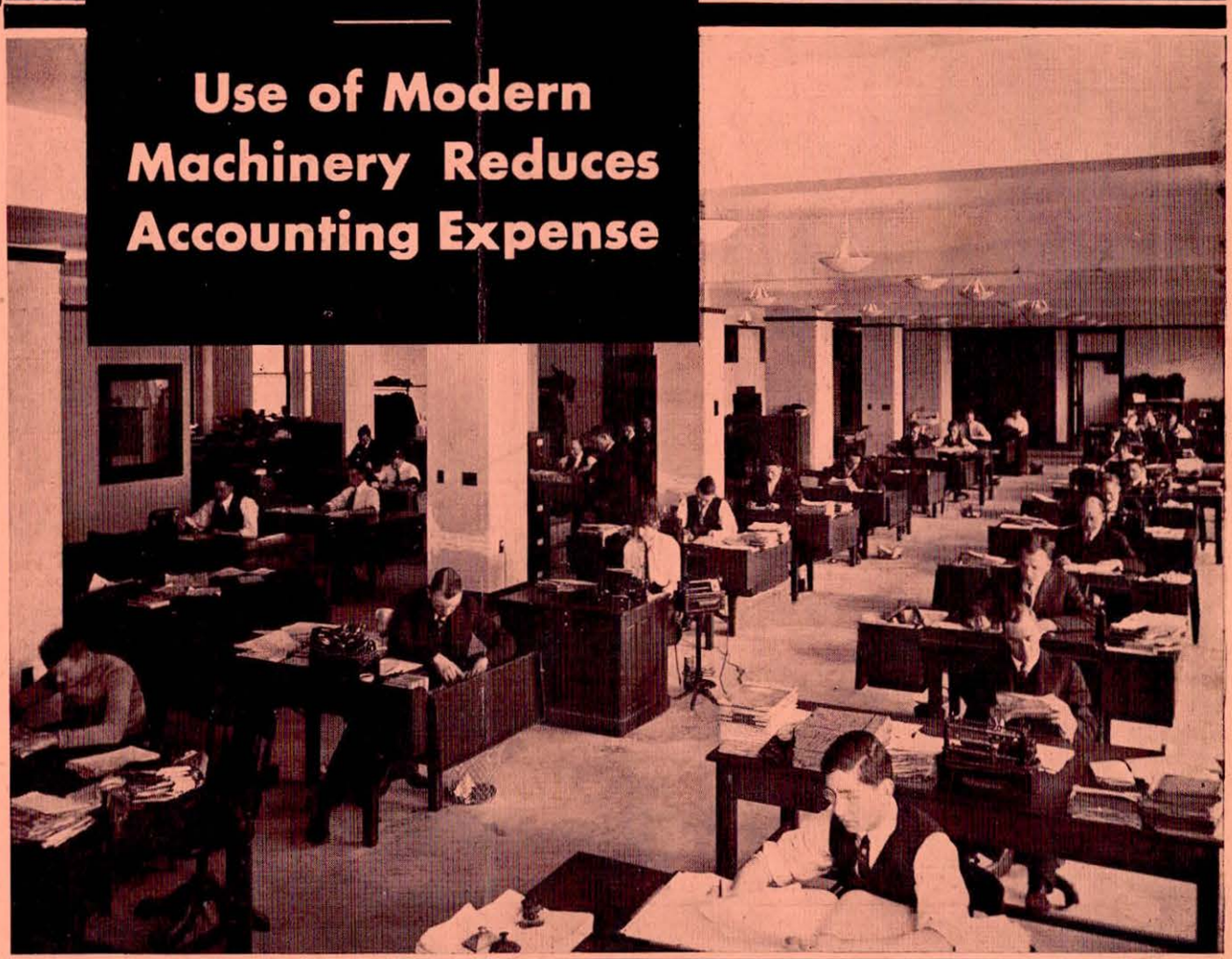
GENEVA COLLEGE LIBRARY,
No.
BEAVER FALLS, PA.

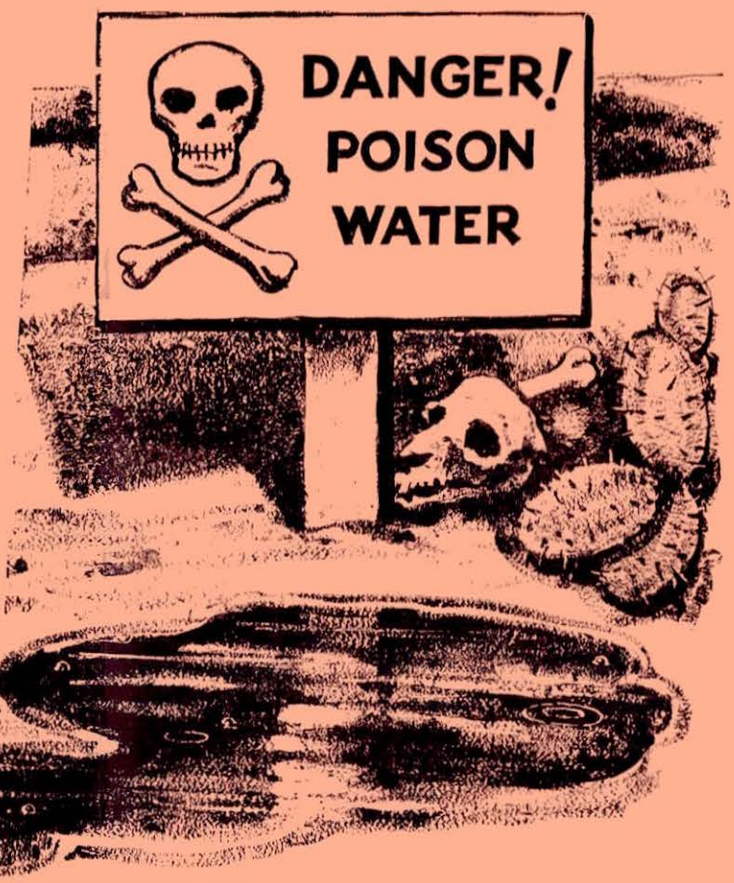
In This Issue

Article No. 15
OPERATING ECONOMY SERIES

Use of Modern Machinery Reduces Accounting Expense

NEXT WEEK
Article No. 16
"Oil-Electrics Are Effecting Savings in Switching Service"





Are you feeding

POISON WATER

to locomotive boilers?

LEADING power plant engineers safeguard expensive equipment by using nothing but water of zero hardness for boiler feed. Locomotive boilers deserve the same consideration — particularly in view of the necessity for preventing interrupted train service.

Hard water, when fed to a boiler, is virtually Poison Water. Think of the troubles it may cause:

(1) **Too frequent cleaning of boilers.**

(2) **Decreased life of flues and fire boxes, with increased cost, labor and material to replace them.**

(3) **Extra fuel burned because scale acts as a heat insulator.**

(4) **Extra trips to the shop and longer stays in the shop.**

(5) **Reduced mileage between shoppings.**

(6) **Increased time out to blow engines down for washouts and caulking of leaks.**

The remedy is to treat *all* locomotive boiler feed with Zeolite Equipment. In fact, no other method of treatment (except distillation, which is too expensive for railway application) absolutely prevents the formation of scale, mud and sludge.

• • •

One large road is saving one-third of a million dollars a year with Permutit Equipment. Can you afford to overlook the possibility of such savings for your road? Write today for "Soft Water for Railroads" — no charge or obligation.

Permutit

THE PERMUTIT COMPANY
440 FOURTH AVENUE, NEW YORK, N. Y.
Manufacturers of Industrial and Household Zeolite Water Softeners, Hot and Cold Lime Soda, Lime-Barium Water Softeners—Sand Filters—Iron, Oil and Manganese Removing Filters—Continuous Boiler Blowoff Equipment—Ranarex CO_2 Indicators and Recorders—Other Power Plant and Water Treating Specialties.

Water Treating Equipment

TWENTY-THREE SALES OFFICES THROUGHOUT THE UNITED STATES

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Published weekly by Simmons-Boardman Publishing Company, 34 North Crystal Street, East Stroudsburg, Pa. Entered as second class matter, March 9, 1928, at the Post Office at East Stroudsburg, Pa., under the act of March 3, 1879.
Address communications to 30 Church St., New York City.

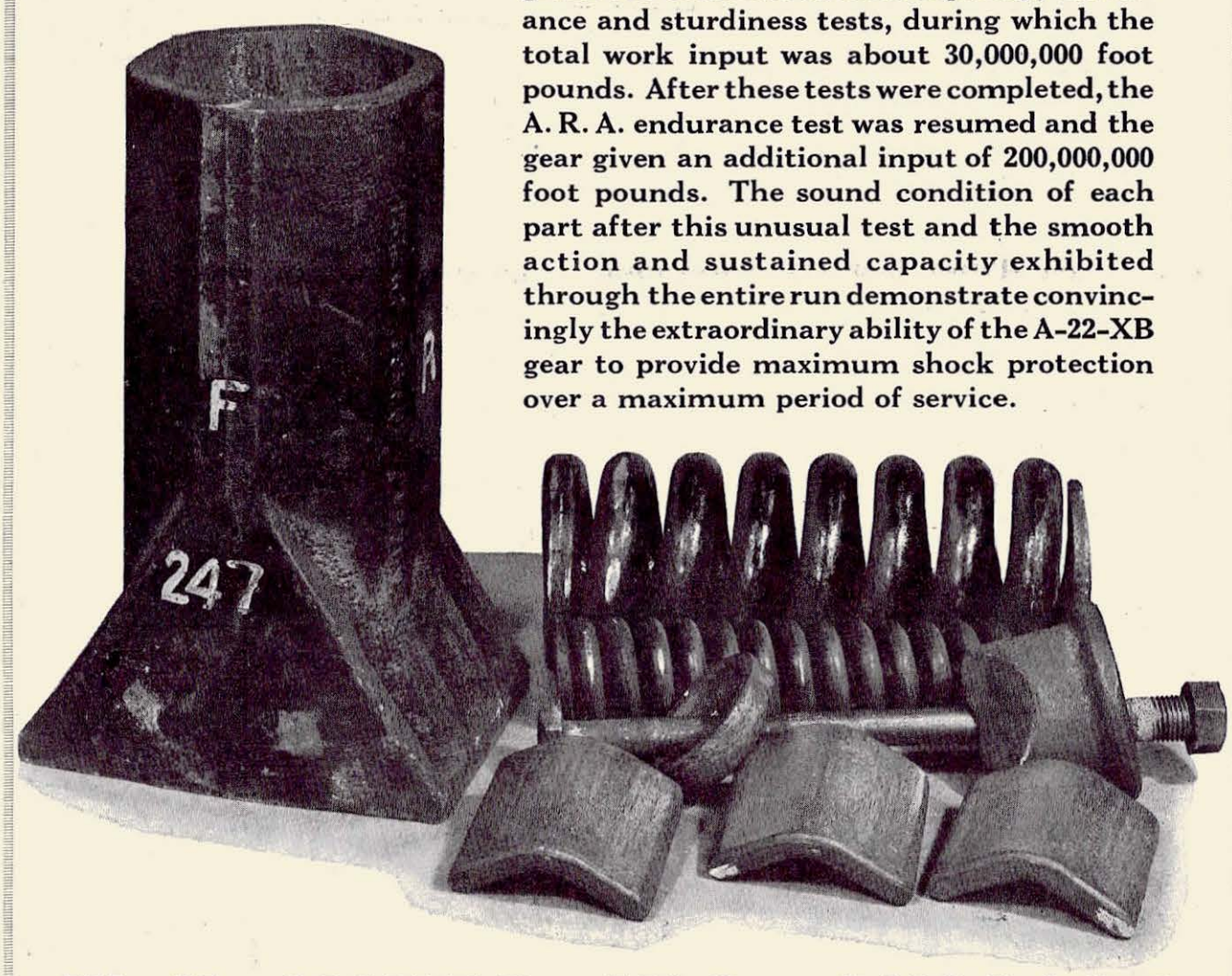
MINER

Class A-22-XB
Friction Draft Gear

TWO HUNDRED AND THIRTY MILLION FOOT POUNDS

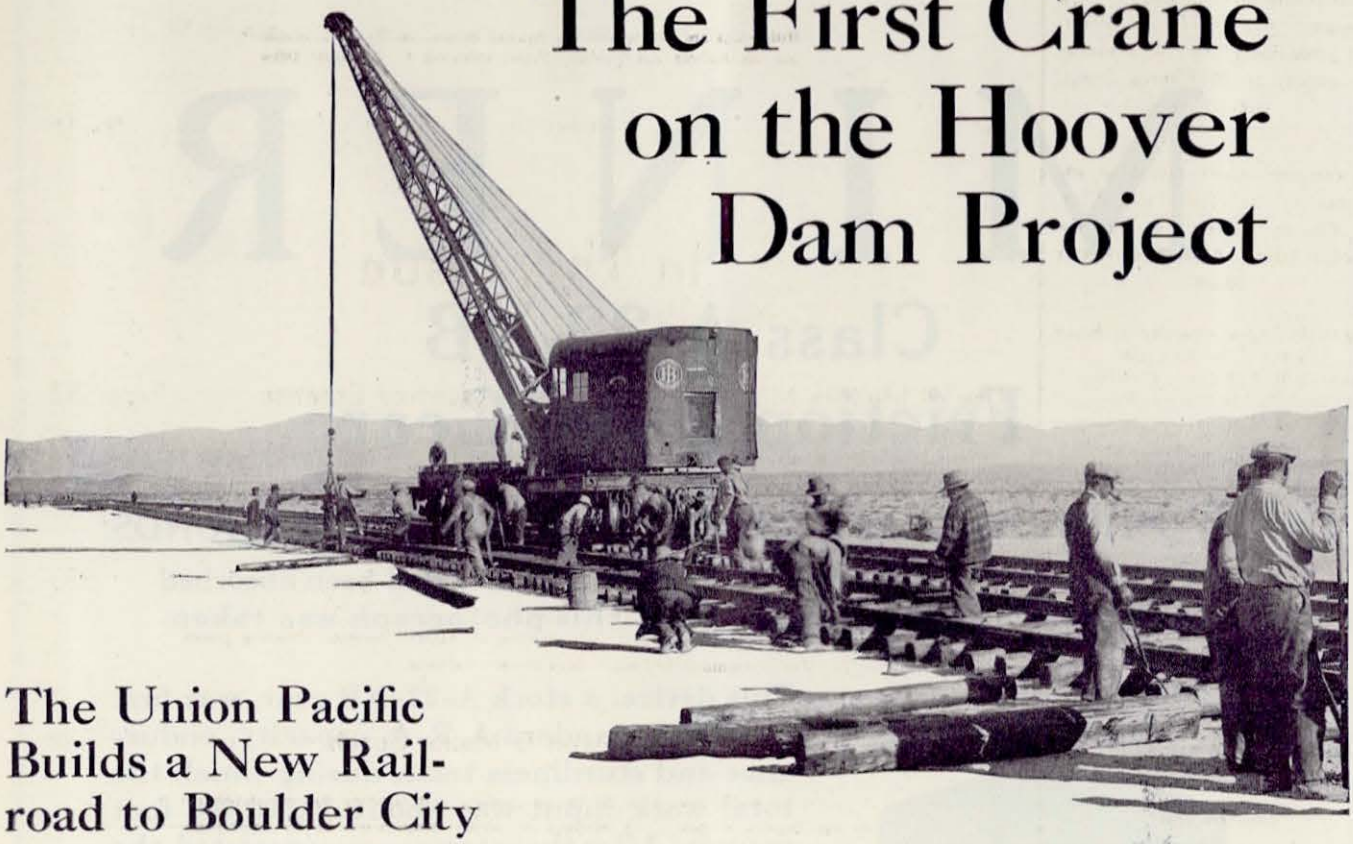
of impact work under the 27,000-pound hammer had been absorbed by the gear illustrated below when this photograph was taken.

This device, a stock A-22-XB gear, was first given the standard A. R. A. capacity, endurance and sturdiness tests, during which the total work input was about 30,000,000 foot pounds. After these tests were completed, the A. R. A. endurance test was resumed and the gear given an additional input of 200,000,000 foot pounds. The sound condition of each part after this unusual test and the smooth action and sustained capacity exhibited through the entire run demonstrate convincingly the extraordinary ability of the A-22-XB gear to provide maximum shock protection over a maximum period of service.



W. H. MINER, INC., CHICAGO

The First Crane on the Hoover Dam Project



The Union Pacific Builds a New Railroad to Boulder City

The building of a 22-mile railroad across the Nevada desert to Boulder City was the first unit let on the Hoover Dam project. This contract was awarded to the Union Pacific Railroad and the illustration shows their first equipment to go over the rails—a No. 5 Industrial Brownhoist gas locomotive crane.

Laying ninety-pound rail, this Industrial Brownhoist averaged a mile a day for the last half of the work. In one eight-hour day 5680 feet were laid and this record could have been increased by several hundred feet had the rail been available.

Ask any Industrial Brownhoist owner, and there are thousands of them, about the uninterrupted, low cost handling service obtained from these cranes. Their universal reply of satisfactory performance is the reason, of course, why these cranes are seen wherever important jobs are under way. It is the reason, too, why you would find an Industrial Brownhoist a big money saver on your own handling work.

Industrial Brownhoist Corporation, General Offices, Cleveland, Ohio

District Offices: New York, Philadelphia, Pittsburgh, Detroit, Chicago, New Orleans, San Francisco, Cleveland.

INDUSTRIAL BROWNHOIST

Published every Saturday by the Simmons-Boardman Publishing Company, 34 North Crystal Street, East Stroudsburg, Pa., with executive offices at 30 Church Street, New York

All communications should be addressed to the New York office, 30 Church Street, or to the Chicago office, 105 West Adams Street

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Railway Age

With which are incorporated the Railway Review, the Railroad Gazette and the Railway Age-Gazette. Name Registered U. S. Patent Office

Vol. 91 October 17, 1931 No. 16

In This Issue

Use of Modern Machinery Reduces Accounting Expense Page 582

This article, the fifteenth in the Operating Economy Series, describes recent progress in the development of mechanical devices for the handling of every accounting task.

Erie Goes to Containers for Supply Work 585

Tells how this road has found skid handling of material between shipping points to be more economical and safer than former methods.

Ice Used for Air Cooling in Boston & Maine Coach 588

A report of preliminary tests of an air cooling and cleaning system developed for the Boston & Maine, to produce an inside temperature 12 to 14 degrees cooler than the outside air.

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The Railway Age is indexed by the Industrial Arts Index and also by the Engineering Index Service

. . . . . Consider these PROVEN FACTS about wood preservation . . .

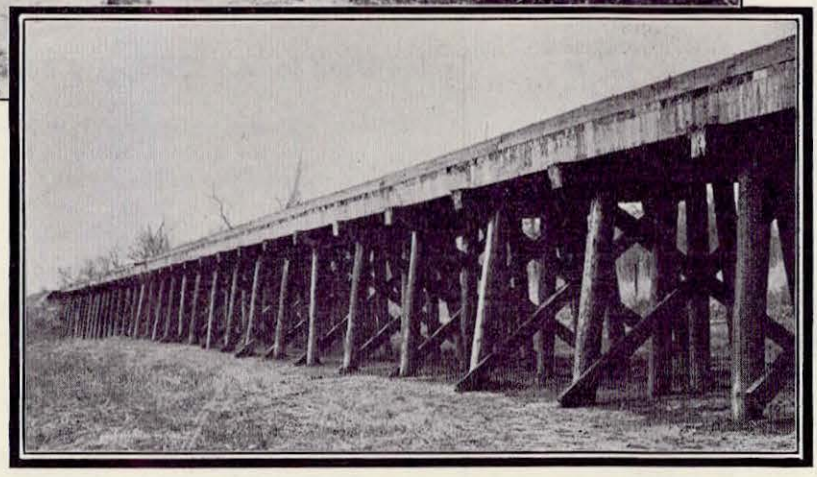


Photo Courtesy Kan. City So. Ry. →

Sufficient time is essential—

THE element of time is important in various phases of wood preservation. It must be carefully controlled, not only in the processes of applying preservatives but also in the preliminary preparation of timber.

The best results are only obtained from timber that has been air seasoned and treated at the right degree of seasoning. With many species satisfactory results cannot be obtained otherwise.

Preparation of stock would appear to be the obvious means of meeting immediate requirements. However, the wide variation in requirements in respect to size, timber specification and manufacturing and treating specification would make a comprehensive stock very large in relation to probable use within a reasonable time. An appreciable portion of the useful life of such a stock would therefore be wasted on the yard. Attempts to eliminate variables of manufacturing and treating requirements result in efforts to keep material sound and in good condition until it is finally treated in accordance with user's requirements. This must lead to holding material untreated and treating it at degrees of seasoning varying between under and over-seasoning or resorting to expedients as "pre-treatment," with uncertain results.

Proven practice establishes that the best treated material can only be furnished when produced with the particular requirement in view, and it is therefore desirable for the user to anticipate requirements in sufficient time to permit such production to be realized. While it is practicable for producers to maintain stocks of satisfactory material for relatively small standard requirements, undertaking to furnish any requirements on short notice will inevitably lead to a product of lesser value in one or more respects.

It has been the policy of this company not to compromise the quality and value of products furnished in order to meet delivery requirements.

AMERICAN CREOSOTING COMPANY
INCORPORATED

COLONIAL CREOSOTING COMPANY INCORPORATED

AMCRECO LOWRY PROCESS CREOSOTED WOOD

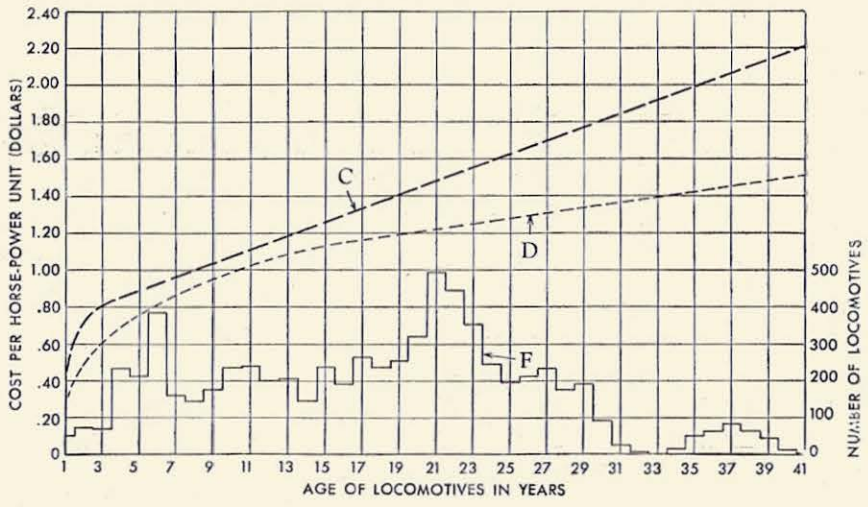
GEORGIA CREOSOTING COMPANY INCORPORATED

LOUISVILLE — KENTUCKY

RA 10-17-Gray

What is Economy?

"Cheapness of operation, relative or absolute, as expressed in steam, fuel, or money." —*Standard Dictionary.*



CURVE C is the projection of maintenance costs published last week.

Curve D represents the lowest maintenance cost found on the five railroads comprised in Curve C, while Curve F represents the number of locomotives comprised in the same curve.

The railroad showing Curve D had far fewer locomotives over twenty-five years old, than any of the others.

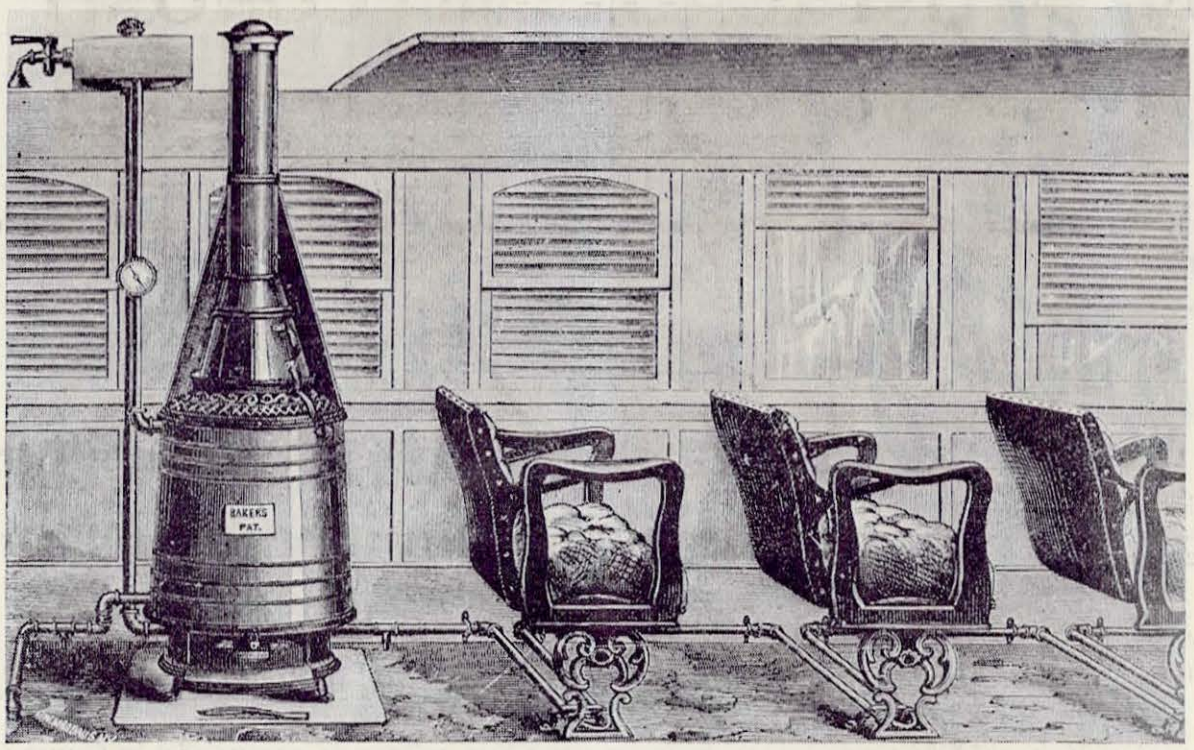
It is now considering establishing a standing rule that all locomotives shall be retired in the twenty-fifth year.

It takes Modern Locomotives to make money these days!

THE BALDWIN LOCOMOTIVE WORKS ★ 1831 1931

THE BALDWIN LOCOMOTIVE WORKS

PHILADELPHIA



The luxurious comfort of the scientifically insulated steel car of today was probably not even a remote possibility to the progressive railway engineer that designed this old wooden car of the early 70's.

"Hot water for the feet of every passenger"

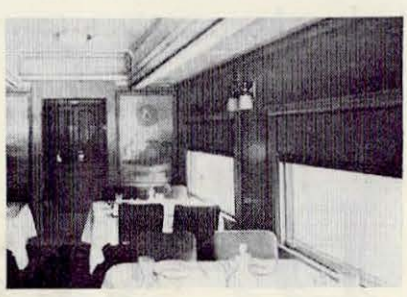
In the early 70's, comfort was questionable... today, materials developed by Johns-Manville *help insure comfort and safety to every traveler...*

WINTER traveling was cold traveling in the early 70's, for up to then, very little had been done about keeping passenger cars warm.

And it was not until improved materials were made available to the engineers, that really substantial progress was made in car-heating methods.

By the development of special insulating materials and methods, Johns-Manville contributed materially to the great advances that have been made in traveling comfort since those early days.

Johns-Manville has also contributed to the economy of railroad operation through the development of efficient insulation for locomotives, refrigerator cars—in fact, every type of insulating problem throughout the industry. Address Johns-Manville, 292 Madison Avenue, New York City.



Passengers in this modern dining car enjoy comfort and quiet comparable to their own homes. Car noise has been reduced 67% by J-M Sound Absorbing Treatment and accurate temperature control has been made possible by J-M Salamander Car Insulation.

Johns-Manville

JOHNS-MANVILLE JM PRODUCTS

Service to Transportation

For "SATISFACTION and ECONOMY" the New York Board of Transportation uses WHITCOMB

Five problems of switching and hauling faced the New York Board of Transportation.

1st: New passenger cars, shipped without motors, had to be unloaded from car floats and put in the barns.

2nd: The new cars had to be shifted from shop to shop for power plant installation. Several shifts of each car had to be made.

3rd: Cars in service had to be taken in and out of paint and repair shops where there was no third-rail.

4th: In these shops cars had to be moved about and placed conveniently for inspection and repairs.

5th: At completion of the new subway system, and before the current was turned on, trial trips with an observation car for inspection purposes had to be made.

Requirements necessitated a locomotive with power, speed and flexibility, and one that would represent low fire hazard in dangerous interiors. Economy was essential in these operations, too.

For "satisfaction and economy" the Board of Transportation bought a standard 30-ton mechanical drive Whitcomb Locomotive. It has "done all the work expected of it . . . has given no trouble."

There is a type and size of Whitcomb to meet any hauling requirement, with satisfaction and economy.

THE WHITCOMB LOCOMOTIVE COMPANY... Rochelle, Illinois

WHITCOMB LOCOMOTIVES

THE exacting requirements of modern track construction necessitate the use of fastenings whose quality is beyond question.

Superior performance is built into Tennessee Track Spikes and Bolts through the use of the best of raw materials, modern equipment, experienced personnel, intelligent inspection at every stage.

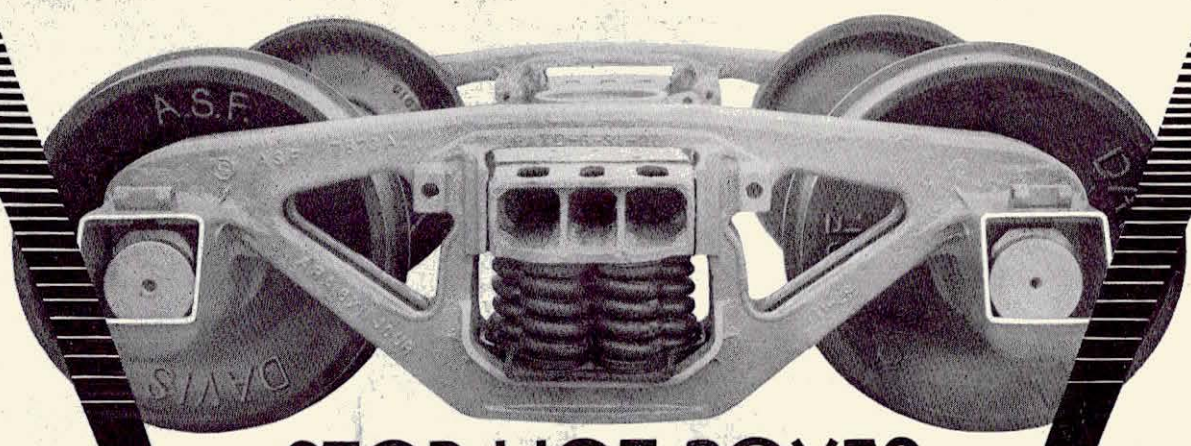
These, together with up-to-the-minute service—shipment when and as needed—constitute good reasons for standardizing on Tennessee Track Materials.

TENNESSEE COAL, IRON & RAILROAD CO.
General Offices: Brown-Marx Bldg., Birmingham, Ala.
Subsidiary of United States Steel Corporation

U S STEEL

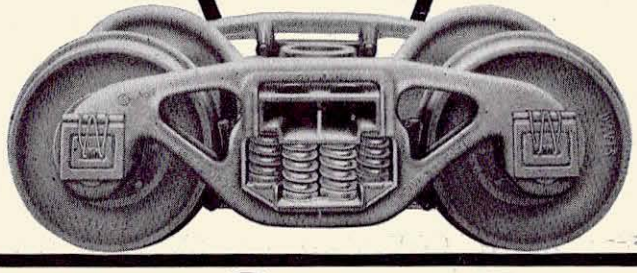
TENNESSEE

Maintain the Oil Film



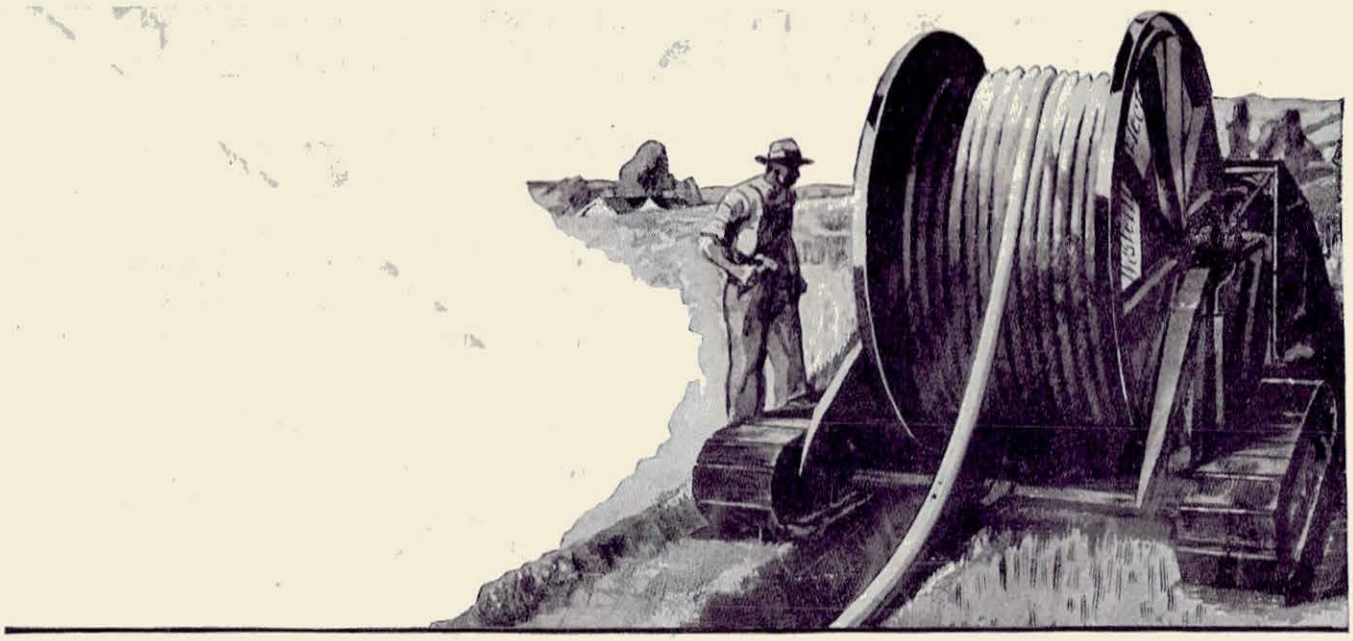
STOP HOT BOXES

THE additional spring capacity of the Dalman Truck protects not only equipment, lading and road-bed from destructive shocks but also the journal itself. The uncushioned blows caused by either overloading or failure of springs breaks down the film of oil and causes hot boxes. The Dalman Truck provides the spring capacity to cushion these blows, so that the film of oil is maintained, materially reducing bearing trouble.

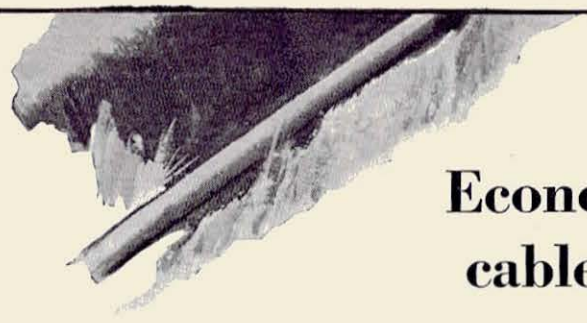


AMERICAN STEEL FOUNDRIES

NEW YORK CHICAGO ST. LOUIS



You bury it RIGHT OFF THE REEL!



Economies of tape armored cable start with the laying

It is so well protected that you can bury this Western Electric Tape Armored Cable *directly in the ground.* Think of the savings in laying costs. Think how much quicker it is to lay.

Once it is laid it lasts a long time. No less than seven layers of protective coatings guard against corrosion from soil or water.

The name Western Electric tells you that this cable is made by pioneers in the manufacture of communication equipment—pioneers that have continued to keep abreast of the times in making apparatus for the Bell System.

Layers of impregnated paper, jute, steel tape and asphalt are placed over the lead sheath.

Western Electric

LEAD COVERED CABLE AND TELEPHONE APPARATUS

Distributed by

GRAYBAR ELECTRIC CO.

GRAYBAR BUILDING, NEW YORK, N. Y., *Offices in 76 Principal Cities*

THESE JACKET SHEETS *Must Be Good*

29 RAILROADS USE THEM

ARMCO

RAILROAD PRODUCTS

MADE BY CONTINUOUS PROCESS

Special Car Siding Sheets
Locomotive Jacket Sheets
Freight Car Sheets and Plates
Passenger Car Sheets and Plates
Galvanized Ingot Iron and Steel Sheets
Hot Rolled Ingot Iron and Steel Sheets

•

Wrought Steel Wheels

ON THE AIR
every Monday night
beginning October 19th
the ARMCO CONCERT BAND
thru WLW — 700 kc.
W8XAL — 6060 kc. (short wave)
9 o'clock — Eastern Time
8 o'clock — Central Time
7 o'clock — Mountain Time
6 o'clock — Pacific Time

WE could tell you much about the dense, ductile structure of Armco Locomotive Jacket Sheets —of their smooth, flawless surface and easy-forming, long-lasting qualities . . . .

Yet the most convincing evidence of their worth is the fact that twenty-nine railroads use them almost exclusively. Year in and year out, these specially processed sheets continue to last through more shoppings than do ordinary sheets. Equally as important, Armco Jacket Sheets reduce forming costs, and provide a lustrous unblemished surface that smartens the appearance of the locomotives.

If the jacket sheets that you use are not all that you think they should be, perhaps we can show you the way to a decided improvement. Just address the nearest office.

ARMCO RAILROAD SALES CO.

Executive Offices: MIDDLETOWN, OHIO

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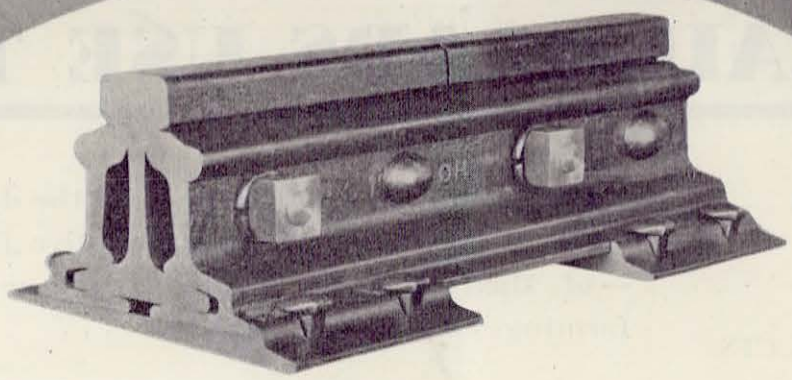
ARMCO
IRON AND STEEL
SHEETS FOR EXACTING RAILROAD USES PLATES

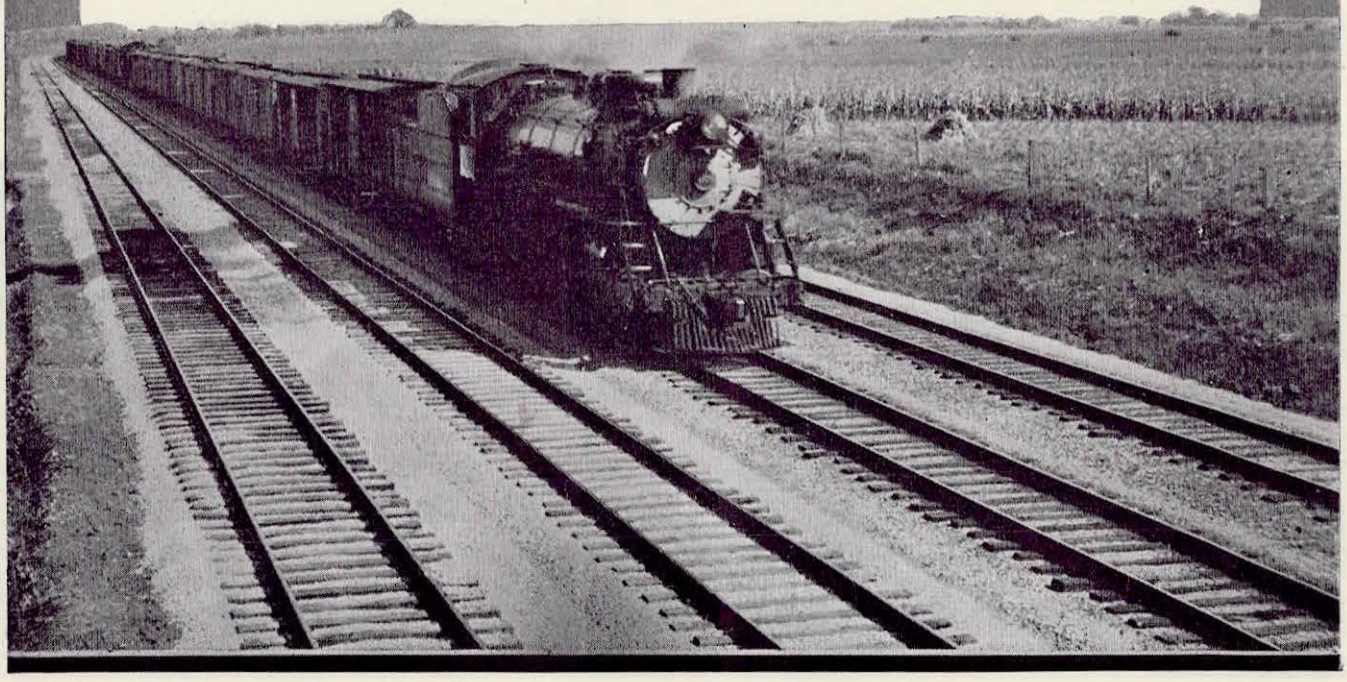
HEADFREE RAIL JOINTS



Make Good Track *Better*

The Rail Joint Company

165 Broadway, New York, N. Y.



A "WALKIE" for Business Men who Think that Typewriters are "Just Typewriters"

Tomorrow do a little "watchful walking"! Walk through your office.

WATCH YOUR STENOGRAPHERS WORK!

WATCH the girl who takes 50% longer to type a sales summary . . . because she hasn't a statistical machine.

WATCH the girl who takes 30% longer to type 100 cards . . . because her typewriter has no card-writing attachment.

WATCH the girl who takes 25% longer to finish a financial statement . . . because she has to set tabulations by hand.

WATCH the girl who has to sit idle while her boss is on the phone . . . because her typewriter isn't Noiseless.

AND THEN . . . figure how many dollars a week it costs you not to have typewriters hand-tailored to your typewriting needs.

We find in America's offices no less than 124 different *kinds* of writing. So Remington makes a complete line of writing machines . . . indeed, the *only* complete line in existence. A model for each related group of uses!

And with 62 special attachments . . . with 55 varieties of type . . . with 3,066 keyboards covering professional needs, specific industries and all languages, not to mention 357 grades and colors of ribbons and 116 weights and colors of carbon papers. Remington Typewriters can be fitted to the specific writing need in your business like a glove fits a hand.

Telephone for a Remington Typewriter man. We promise to *prove* not only more satisfactory *typing* . . . but amazingly lowered costs. Remington Rand, Executive Offices, Buffalo, N. Y. Sales Offices in all principal cities of the world.

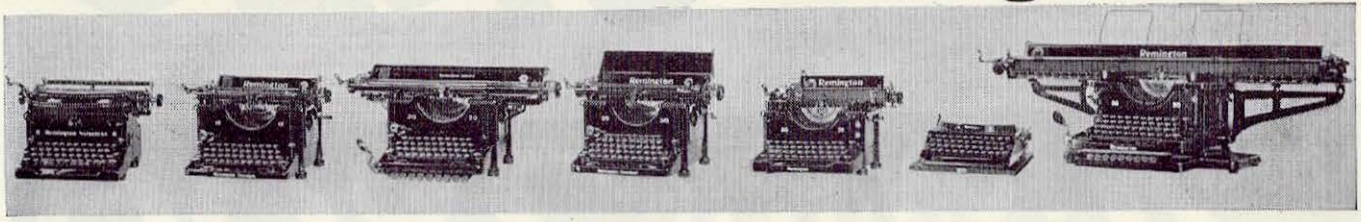
THE REMINGTON LINE OF TYPEWRITERS

built for specific purposes, is one of a variety of lines of office appliances and equipment manufactured and installed by Remington Rand . . . including Kardex Visible Records . . . Library Bureau Filing Equipment . . . Baker-Vawter-Kalamazoo Loose Leaf . . . Safe-Cabinet fire protection . . . Dalton Adding and Bookkeeping Machines . . . Remington Accounting Machines . . . and Powers Tabulating Machines.

SAVING! *Insurance Company cut 40% off operators' time in typing hundreds of thousands of premium, dividend and interest notices by adding two simple typewriter attachments.*

Remington Typewriter Division

Remington Rand



BUILDER OF TYPEWRITERS FOR SPECIFIC PURPOSES

A BIG, FAST, POWERFUL HEAVY-DUTY CARRIER . . . at an Extremely Low Price

Climaxing years of truck building experience Reo offers the new 4-Tonner, a commercial carrier built in tractor, dump, trailer and van types for every heavy hauling need.

Engine, frame, axles, brakes, springs and all component parts are coordinated in a perfectly balanced chassis, which boasts maximum power for weight, extreme sturdiness, and utmost safety under all load and travel conditions.

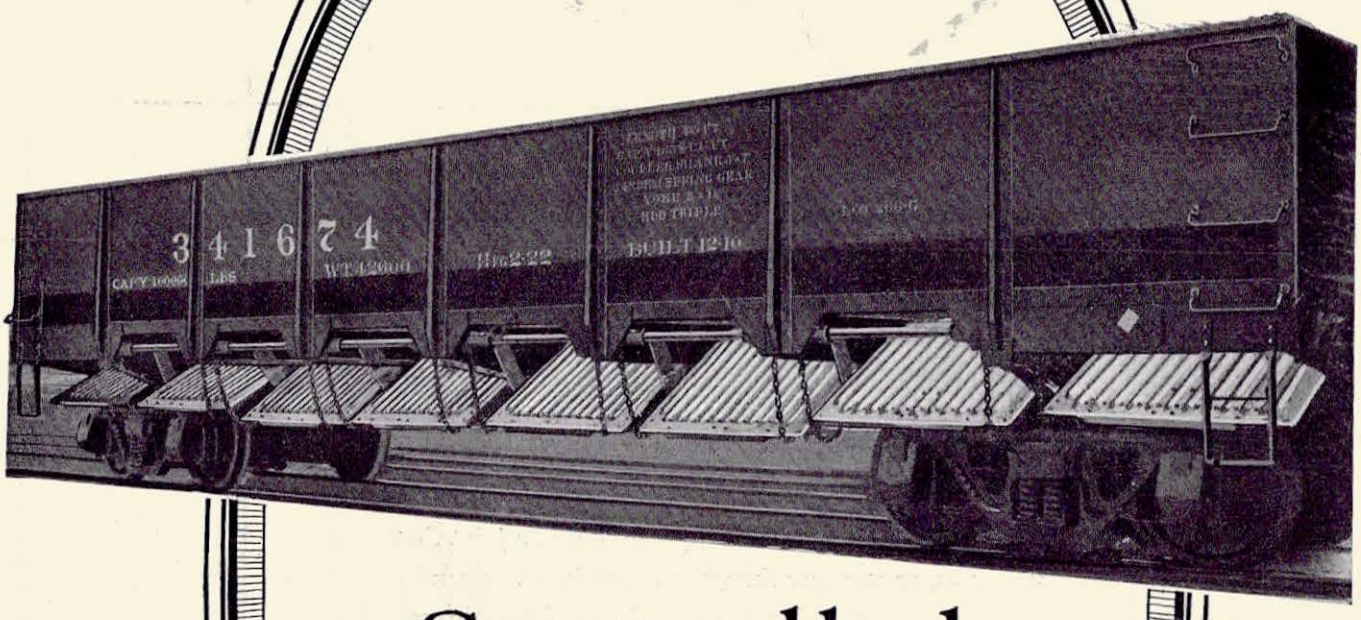
REO MOTOR CAR COMPANY
LANSING · TORONTO

REO

150-inch wheelbase chassis $2800*
170-inch wheelbase chassis $2875
190-inch wheelbase chassis $2950

Reo Trucks and Speed Wagons range from 1½ ton to 4 tons. Prices $625 to $2800, chassis f. o. b. Lansing

BIG 4 TONNER $2800



Controlled Tendencies

When the load from tipple or shovel strikes the gondola drop doors there is a tendency to distort them. Ajax Corrugated Doors have more than twice the strength of flat plate doors.

UNION METAL PRODUCTS CO.

New York Chicago St. Louis
Washington Richmond
Houston San Francisco
Kansas City Montreal

AJAX

CORRUGATED DROP DOORS

OXWELDING

means faster repairs

A PROMINENT labor leader, in a recent article in The New York Times, says: "Repairs which before the introduction of the oxy-acetylene welding process took eight men three weeks for one locomotive can now be done in from three to seven hours with a force of not more than four men."

Oxy-acetylene welding speeds repair work and reduces its cost because it makes the ordering and stocking of replacement parts unnecessary. By fusing the damaged members into a permanently solid unit, it produces a joint that is as strong as, or stronger than, the metal itself. It can be used on iron, steel, aluminum, copper, lead, brass, bronze, and many ferrous and non-ferrous alloys.

Oxy-acetylene cutting provides a quick, easy way to cut steel and iron to shape, to demolish steel and iron structures, and to increase the value of scrap by cutting it into charging box sizes.

For nineteen years, The Oxweld Railroad Service Company has contributed to the efficiency of American railroads by providing them with the best methods and materials for oxy-acetylene welding and cutting. Year after year, the majority of Class I railroads are finding this service of increasing value.

OXWELD RAILROAD SERVICE

THE OXWELD RAILROAD SERVICE COMPANY

Unit of Union Carbide and Carbon Corporation

UCC

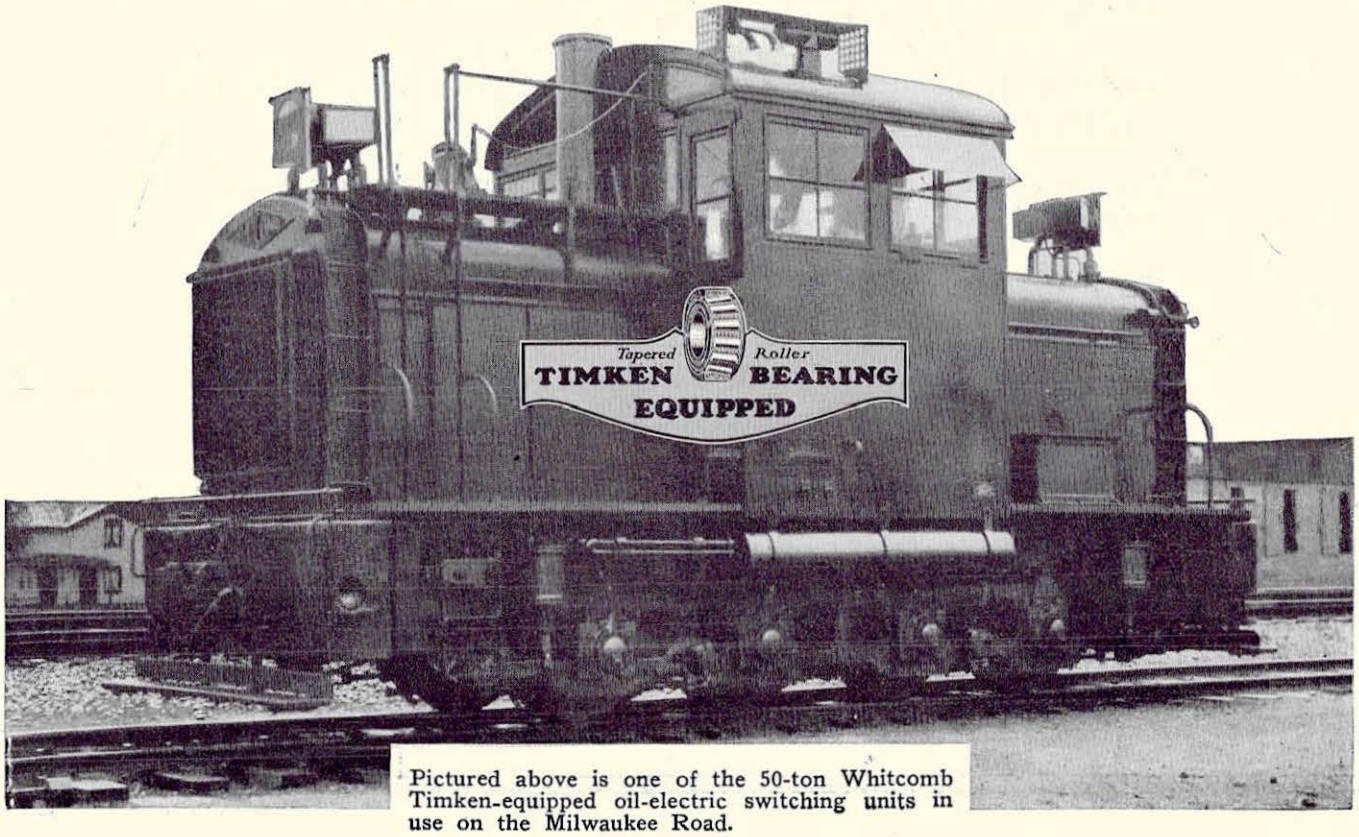
NEW YORK, Carbide and Carbon Building

CHICAGO, Carbide and Carbon Building

All large WHITCOMB oil and oil-electric locomotives, manufactured by The Whitcomb Locomotive Co., Rochelle, Ill., are standardized on Timken Bearing Equipped axles

Dependability, economical operation and cut-to-the-bone maintenance are inseparably associated with Timken tapered construction, Timken positively aligned rolls and Timken-made steel in all types of rolling stock. Specify Timkens. The Timken Roller Bearing Company, Canton, Ohio.

TIMKEN
Tapered
ROLLER BEARINGS



Pictured above is one of the 50-ton Whitcomb Timken-equipped oil-electric switching units in use on the Milwaukee Road.

Less Than One Cent

per roof per year for maintenance

THE cost of roof maintenance, from 1913 to 1930 inclusive, on 30,000 Canadian National cars equipped with Dry Lading Roofs, amounted to $4,519.49.

The average maintenance cost per roof, per year, during this 18 year period, amounted to less than one cent.

This remarkable record is indicative of efficient management and a deserved reward of far-sighted vision.

It expresses the value of Dry Lading Roofs in terms of long trouble-free service and dollars and cents savings.

It proves that there is a vast difference between the mere purchase of roofs and really investing in a long term weather-proof roof service.

It proves that low price does not mean low cost but long service does. It's the cost per year that counts.

You cannot get around years of actual records. The Universal Dry Lading Roof is the greatest economical improvement in car construction.

Hutchins Car Roofing Company

RAILWAY AGE

A Ten Years' Lesson in Railway Economics

While the Interstate Commerce Commission is considering the application of the railways for a 15 per cent advance in freight rates, the national administration, under the leadership of President Hoover, is working on measures to stop the decline in the prices of railroad bonds and prevent the destruction of railroad credit. Action by President Hoover, and even by Congress, to prevent the bonds of most railroad companies from ceasing to be legal investments for fiduciary institutions, or even to lend the credit of the government to many railroad companies to save them from becoming bankrupt, would be helpful in the present emergency; but the fact must be recognized by business men, public men and the public that such emergency measures will be of only temporary value. The depression has made the present railroad problem so acute as it is at present, but has not created that problem; and however desirable palliatives may be, what the railroad industry needs is not palliatives, but a cure for a wasting disease from which it has long suffered.

The present railroad problem has been created by the regulation of railway rates throughout the last ten years. The problems of the railroad industry would be no more serious now than those of other industries if a constitutional and economically sound policy of regulation had been followed since 1921; and a permanent solution of the railroad problem cannot be achieved under private ownership except by the adoption by the Interstate Commerce Commission of a different policy of regulation of rates in future. The decision of the commission in the 15 per cent rate case is awaited with so much anxiety by all who are really familiar with the present railway situation and its causes, not only because the commission's decision will largely determine the way in which the railroad industry will pass through the present crisis, but also because it will indicate whether the commission recognizes its responsibility for the present situation and is inclined to follow a more constructive policy in future.

The Transportation act of 1920 directed the commission to so initiate and adjust rates as to enable the railways, under honest, economical and efficient management, to earn a fair annual return. They are entitled under the constitution to such a return, and the rate-making provisions merely told the commission how to enable them to earn it. The commission held that a fair return would be 5¾ per cent annually. Everybody knew that rates could not be so regulated as to cause a return of 5¾ per cent to be earned in each year. Therefore, it was obvious that rates should be so regulated as to enable the railways to earn an average of 5¾ per cent over periods of years, the result of which would have been that they would have made earnings in excess of a fair return in good years to offset the deficiencies under a fair return that would inevitably have been incurred in poor years.

What a Fair Return Would Have Cost

How much higher would freight rates have had to have been during the last ten years to have enabled the railways to have earned an average of 5¾ per cent annually, and to have passed safely through the present depression without a general advance in rates? Two bases of computations are available. One is the property investment account of the railways. The other is the tentative valuation made by the commission in 1920, plus the increase in property investment that has since occurred.

The property investment of the Class I roads increased from about $21,700,000,000 in 1922 to almost $27,000,000,000 in 1931, and during these ten years has averaged $24,570,000,000. An average annual return of 5¾ per cent upon this average property investment would have been about $1,413,000,000. Estimating the net operating income of 1931 on the basis of what was earned in the first eight months of the year, the net operating income earned during the ten-year period will average $996,000,000, annually, or about $417,000,000 annually less than 5¾

per cent. Average annual freight revenues have been about $4,395,000,000. Therefore, freight rates averaging 9.48 per cent higher than those actually charged would have enabled the railways to have earned an average of 5¾ per cent on property investment throughout the ten years instead of only 4.05 per cent, which actually was earned. Furthermore, with freight rates this much higher than they actually were, and all other things being equal, they would have earned in 1930 a net operating income of $1,256,000,000, or 4.73 per cent upon property investment, instead of the $869,000,000, or only 3.27 per cent, that they actually did earn, and in 1931 a net operating income of about $865,000,000, or 3.22 per cent upon property investment, instead of the $547,000,000, or only 2 per cent they probably will earn, and could have passed safely through the depression without an advance in rates.

The period of ten years has included seven years of prosperity and three years of depression—the years of depression being 1922, 1930 and 1931. In order for the railways to have earned an average of 5¾ per cent throughout the decade they would have had to have earned in excess of six per cent in six of the ten years. The largest return would have been only 6.82 per cent, in 1926, which surely could not reasonably be regarded as excessive for an industry to earn in the year of its greatest prosperity in a decade.

Let us now see what computations based on the commission's own tentative valuation show. The tentative valuation amounted in 1922 to $19,521,000,000, and in 1931 to about $24,857,000,000, and during the ten years averaged about $22,458,000,000. An average return of 5¾ per cent upon this would have amounted to $1,291,000,000 annually. The net operating income actually earned has averaged $996,000,000, or only 4.44 per cent on the valuation. This has been $295,000,000 annually less than a fair return upon the commission's own basis of valuation. Freight rates only 6.72 per cent higher than those actually charged would have enabled the railways, other things being equal, to have earned this additional return. With freight rates 6.72 per cent higher than those actually in effect the railways would have earned in 1930 a net operating income of $1,143,000,000, or 4.65 per cent upon valuation, instead of $869,000,000, or only 3.54 per cent, the amount actually earned, and in 1931 a net operating income of $772,400,000, or 3.11 per cent, instead of $547,400,000, or only 2.20 per cent, the amount that will be earned. Even on this basis the railways could have passed safely through the depression without an advance in rates. In order to have earned an average of 5¾ per cent on the tentative valuation throughout the ten years they would have had to have earned in excess of six per cent in the seven consecutive years from 1923 to 1929, inclusive, but the highest return earned in any year would have been only 6.9 per cent in 1926.

The foregoing figures demonstrate one thing conclusively. This is that if 5¾ per cent on any basis is, as the commission has held, a fair annual return, the railways must be allowed, in order to get that return as an annual average, to earn more than six per cent in years of prosperity, because their return declines so much in years of depression that if they are restricted to less than six per cent in years of prosperity they cannot possibly earn a fair average annual return over a period of years.

Why Railways Are in Trouble

The facts given show the principal reason why the railways are in their present financial plight. The Transportation act gave the commission a mandate to so regulate rates as to enable them to earn a fair return. The fixing of freight rates averaging only from 7 to 10 per cent higher than those actually charged would have been a reasonable compliance with the act, and would have enabled the railways to prosper along with other major industries during the years of prosperity and to have weathered the present financial storm, without seeking a general advance in rates at the worst possible time. The industry and commerce of the country could have stood rates from 7 to 10 per cent higher without difficulty or hardship.

The series of developments which brought about the present railway situation began in 1922, when the commission ordered a general reduction of 10 per cent in freight rates upon the theory that it would help to revive business and cause an increase in traffic that would more than compensate the railways for the reduction in rates. In the normal course of general improvement in business, there did occur an increase in freight business, but this was accompanied by further reductions of freight rates and a steady decline in passenger earnings, and in consequence year after year the railways failed to earn a fair return. The commission was constantly warned that if they were restricted to such small returns in good years they would inevitably face disaster if a serious depression came, and they are now actually facing disaster principally because the commission persistently failed to perform the duty expressly imposed upon it by the rate-making provisions of the Transportation act by readjusting rates upward.

It is to be hoped that the commission in its decision in the 15 per cent rate case will deal constructively with the present emergency. We repeat, however, that the record demonstrates that the policy of regulation of rates followed during the last ten years must be permanently changed if the railroad problem is to be solved under private ownership. The industry and commerce of the country can stand rates high enough to enable the railways to earn a fair return better than they can stand railroad bankruptcy and the danger of resulting government ownership; and industry, commerce and the public must choose between these two alternatives.

Steamship Operators Show Great Merchandising Skill

When any business enterprise shows sufficient merchandising skill not only to sell its offering in large quantity to the public but also at the same time to attract first-page metropolitan newspaper publicity to its exploit, then that enterprise suggests its possession of an idea which others with things to sell might profitably emulate. The liner Belgenland on Columbus Day made a one-day "cruise to nowhere" from New York, leaving at 9:15 a.m. and returning at 11:30 p.m. It carried 1,647 passengers at $10 each and sold staterooms to 800 of them at from $5 to $10 each. Sales of refreshments brought added thousands of revenue—altogether apparently a profitable piece of business to the steamship company, especially since every dollar represented new business and not traffic diverted from regular trans-Atlantic travel. The steamship company by its merchandising skill garnered in some thousands of dollars which otherwise would have reposed in the bank or been spent for clothing, an installment on a radio, a bus ride or a railroad journey. Moreover the idea was sufficiently novel so that New York's leading tabloid newspaper with a circulation of over one and a quarter million published in a prominent location an account of the cruise, written by one of its best known reporters and illustrated with more than a page of photographs—publicity worth thousands and thousands of dollars.

Revenue Producing Cruises

Similarly successful but longer and more expensive "cruises to nowhere" have been featured by the trans-Atlantic steamship companies during the past summer, and, from all accounts, they seem to have been life savers as revenue producers in such a time of depressed travel. It is, of course, obvious that much of the public interest in these excursions has arisen from the fact that the national prohibitory law does not apply to foreign vessels on the high seas. On the other hand, the steamship operators must at least be given credit for their ingenuity in discovering their opportunity and capitalizing upon it to the utmost. The restriction of immigration was a blow to trans-Atlantic shipping but the operators were resourceful. They developed the tourist class of travel and got hundreds of thousands of willing American citizens to make up the losses of immigrant passage money. Now with the depression curtailing trans-Atlantic travel, they have found a new source of revenue. Have our railroads shown equal resourcefulness in seeking new business to replace that which they have lost?

One of our foremost publicists has outlined the fundamentals of a successful sales campaign as follows:

1. Get a product for which there is a large public demand, actual or potential.
2. Package it attractively; and offer it in convenient form.
3. Price it properly.
4. Advertise it wisely.

Making the Railroad Product Attractive

The railroads have a product that the public wants. They know that from past experience if they do not know it today. The customers have been lured away from the railroads because other industries have offered them something either more attractive or better priced or both. Packaging and convenience, as far as the railroad is concerned, might be taken to mean the attractiveness, cleanliness and comfort of trains and stations, convenience of schedules and simplicity in rates and time-tables. In making their service more attractive the railroads have made important progress. They have made extensive experiments in pricing in the past year or so. Some such experiments have succeeded. Others which have failed have not been altogether convincing for the reason of the complexity of many of them. To offer low rates provided the passenger takes a train at an inconvenient hour and has to study a dozen or more tariff restrictions, and then to find that these rates do not bring in the business, offers no ground for condemning the rates or the effectiveness of the advertising which announces them. There are numerous efforts being made by individual railroads which have been successful in attracting business. The characteristic which most of the successful plans have is simplicity. The man who has to be reached is the man who is not contemplating a train journey. A plan so involved that it taxes his memory will not attract him, be it ever so well advertised.

Merchandising vs. Regulation

Full adoption of department store or steamship methods to merchandise railroad service would soon bring the railroads into conflict with present regulatory procedure, designed to curb a no-longer-existent monopoly.

The railroads should, however, go as far as they can under existent regulation in competing with their rivals and, when halted by it, indicate forcefully wherein regulatory practices are curtailing their service to the public. Railroad service, in many of its phases, is now as much a competitive business as selling automobiles or ladies' dresses. It cannot hold its own while it is the only competitor which must submit to hog-tying. But the initiative for freedom must come from the railroads. No one notices that a dog is tied unless he strains at the leash. Vast public support for relief from stifling regulation might well be the result if the railroads would show what advantageous steps they would, if permitted, take, and would point to the specific laws or rulings restraining them from such desired action.

Use of Modern Machinery Reduces Accounting Expense

Great recent progress in development of devices for every accounting task—Railroad accountants, pioneers in use of machines, are alert to their advantages

PERSONS familiar with modern banking practices and the high degree of mechanization attained some times wonder at the amount of "pen-and-ink work" which still obtains on the railroads. The assumption that railroads have been slow to adopt machine methods would, however, be erroneous. As a matter of fact almost forty years ago tabulating machinery was introduced on the railroads and its use has been widespread ever since. There is one very good reason why mechanization is not as easy to attain on a railroad as it is in a bank, that is the fact that railroad recording is so widely disseminated, where that of the bank is concentrated under one roof. It would not probably, for instance, be in the interest of economy to provide every section foreman with a typewriter and an adding machine for the purpose of making his daily reports. On the other hand, however, there certainly is a point in the accumulation of railroad accounting records where the use of modern machinery methods may begin, with savings more than sufficient to pay an adequate return on the necessary capital investment. In some places machinery may be substituted for pen and ink work without any material change in organization or methods. In others, in order to get a sufficient degree of equipment utilization to pay a return on the investment, it may be necessary to concentrate accounting work into central offices.

Accounting expenses of the Class I roads in a normal year reach a total not far from $100,000,000, although the term "accounting," in that connection, is somewhat elusive. If a wider application of machine methods could bring a substantial percentage reduction in this cost, it can readily be seen that the resultant economy to the railroad industry would be one of considerable consequence. There are instances in some departments of a railroad where one single capital improvement will produce savings running into the hundreds of thousands, or even millions, of dollars annually. Such instances, naturally, are spectacular and attract widespread attention. Economies in accounting methods, involving a few hundred dollars here and a few thousand there, are much less spectacular. They are in the aggregate, however, no less important in their bearing upon net income than the isolated cases of concentrated economies which so easily draw attention, and they do not, as a general rule, entail the large capital expenditures necessary for the more spectacular improvements. A saving of $200 a month in clerical expense in a division superintendent's office by the installation of modern adding and calculating machinery may seem, in itself, a small

sum and one scarcely worth any great attention. On the other hand, however, if such an installation can save this sum in one superintendent's office, possibly it can effect a similar saving in every division office on the railroad. If a road had 15 divisions, this saving would aggregate $35,000 a year, an amount plainly worthy of consideration.

To quote from a monograph on the subject of machine accounting prepared for the last meeting of the International Railway Congress by William E. Eppler, formerly comptroller of the Delaware & Hudson: "The economy effected by the use of machines in simplifying statistical and accountancy work is sometimes real, tangible, and convincing; is sometimes elusive, intangible, and difficult or impossible of demonstration; is sometimes non-existent, but even that situation is not necessarily subject to warranted criticism under all circumstances. The reduction of the nerve-racking monotony incident to clerical work is frequently regarded as sufficient justification for the installation of machines."

Accounting machines were first used in the auditing of freight statistics. The applications of the method and the development and perfection of the devices themselves have progressed to the present stage wherein the machines are used for every phase of accounting in various railroad departments. Some of the accounting and statistical tasks in which this method is profitably used are: Freight accounting, local and interline; labor and payroll accounting; zone and freight station accounting; I.C.C. reports; employees' statistics; material accounting; ton-mileage statistics; equipment records; accident statistics; loss and damage claim statistics; fuel and lubricant consumption; and rail failure statistics.

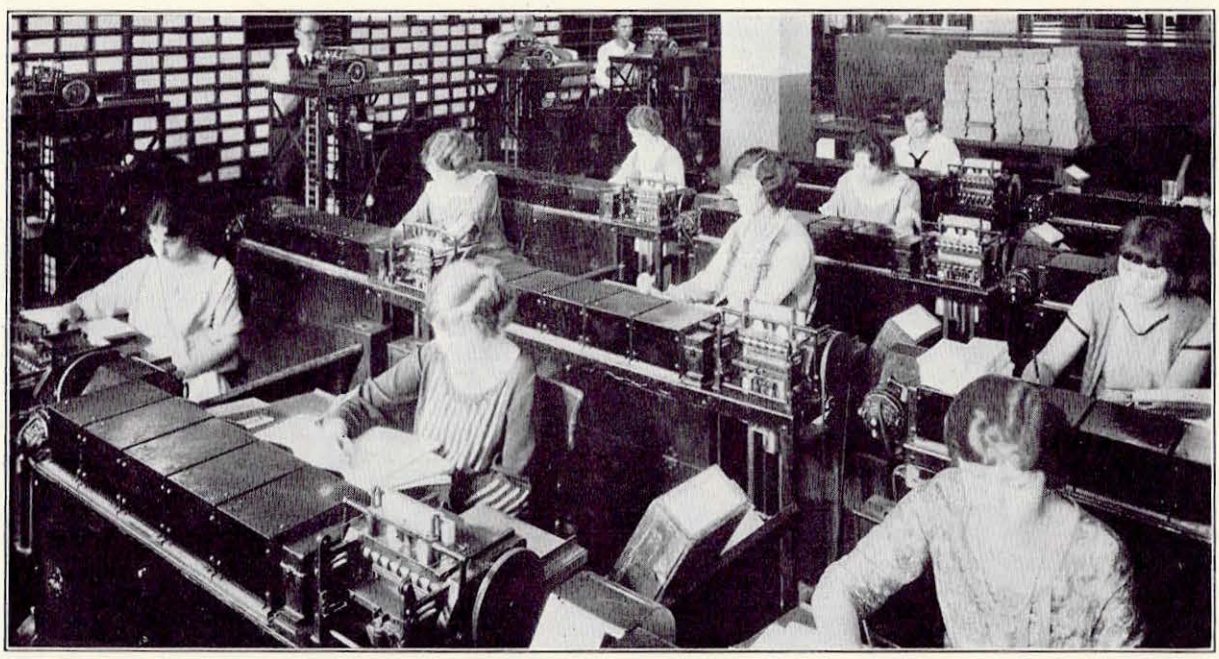
Railways Pioneers in Machine Methods

The railways, as stated before, were pioneers in the development of machine accounting. The first development took the form of "punched hole accounting," i.e., the punching of holes in cards corresponding with numbers, which cards are then run through sorting and tabulating machines which give the various totals required. Such machines, as indicated, have a wide variety of uses and can usually show substantial economies over older methods, provided the volume of work to be done is great enough to keep the machines busy. This necessary volume can often be obtained by concentrating accounting operations into relatively few offices. Such concentration and the use of machine methods, on the Cleveland, Cincinnati, Chicago & St. Louis with a net saving of $90,000 was described in a paper by J. C. Wallace, then general auditor of the Cleveland, Cincinnati, Chicago & St. Louis (now general auditor disbursements, New York Central) in a paper presented at the June meeting of the Railway Accounting Officers Association and published in the *Railway Age* of August 8. In the car accountant's office of another road, punch hole accounting methods used to compute freight car mileage, gross and net ton-miles, train-miles, train-hours and engine mileage, effected an immediate saving of $600 a month. Still another road uses this method in accounting for per diem, resulting in considerable savings and a much lower percentage of error.

Zone Accounting

Zone accounting, i.e., the concentration of all accounting for all stations in a given zone, is another means of reducing expense and errors. One road, using six bookkeeping machines, handles in one office all the accounting for 155 stations, with an average of 182,000 reporting and 120,000 accounting items. The procedure used in handling the Freight Received Report, for example, is as follows:

The R.A.O.A. zone accounting plan, recommendatory, is in effect. The waybills are sorted by agents before sending them to the zone office. Received waybills are in pronumber order and forwarded waybills in waybill number order. One copy of each freight bill is furnished the zone accounting office with the waybills. The waybills and freight bills are sorted in separate groups by station order. Waybills are given to the abstracting department and freight bills to the card punching department of the tabulating machine division.



Abstracts are written on the accounting machines from the waybills and the four columns—Weight, Freight, Advances, Prepaid—are automatically added. The abstracts are then passed to the report desk together with the waybills from which they were made. The card

punching department prepares cards from the freight bills, which are then tabulated and totaled by stations. These tabulations together with the cards and freight bills are passed to the report desk for balancing with the abstracts.

By this method, parallel totals are obtained, providing for an efficient and accurate mechanical audit against errors in expensing, abstracting and card punching. Monthly summaries of reports are made daily by cutting master cards for the totals of each station report. These are tabulated and balanced against a similar run of accounting totals at the close of the month. A great saving in clerical help was effected through the installation of the system, and an accurate daily audit of stations provided by the installation of the zone accounting plan, the net cost per 100 items being reduced to 33½ cents.

Reducing Card Operations

The use of punch hole accounting, however, does not mean the exhaustion of all possibilities of savings. There are other machines which may be used in conjunction with this method, or independent of it, and show material economies. A study of card operations may suggest methods to reduce the number of individual items handled. One road, for example, decided to consolidate its l.c.l. waybills as much as possible so that a smaller number of punch cards would be required. Electric calculators were installed, one operator using two machines, the first to accumulate hundredweight and freight charges and the second for the accumulation of advances and prepaid. This method eliminated the use of 350,000 punch cards per month and effected savings in labor and rental for accounting machines totaling $27,630. Interest and depreciation on the electric calculators and wages of operators totaled $8,050, leaving a net saving of $19,580.

Bookkeeping machines are being profitably installed in many places. One road uses them in the offices of the auditor of revenues, the treasurer, and the auditor of disbursements. The same company uses duplex accounting machines in its larger agencies for making received abstracts and interline forwarded abstracts and an M.C.B. billing machine for its M.C.B. bills. These installations have effected an annual payroll saving of $18,070 and in addition have provided much more satisfactory and quicker accounting.

General Utility and Specialized Machines

There are, of course, certain machines, such as adding machines, calculators, etc., which are more or less standardized and will fit in to many different departments on the railroad. On the other hand, there are special machines designed particularly for specific railroad tasks—everything from recording cash collections in dining cars to writing dividend checks for stockholders, and every job in between. Among recent new equipment made available may be mentioned the following: A machine for preparing agents' abstracts and station register in one operation; one for compiling freight statistics and auditing agents' accounts; one for writing abstracts and division sheets of interline waybills; one for establishing interline road control figures.

To refer again to the monograph of W. E. Eppler mentioned above: "It remains for every railroad to decide for itself what machines, if any, to use in simplifying its statistical and accountancy work. Conditions vary; the needs and demands differ on various railroads, and there are many factors to be considered. The machine that is particularly adapted to the requirements of one railroad may not necessarily be a success on another railroad. On the other hand, some machines attain general widespread use and acceptance. All that has had the effect of encouraging inventive genius and promoting research into and the development of machines adapted to railroad office use. Consequently, those interested in such machines, from the standpoint of utility, usually have a wide range of choice, depending much upon the needs, demands, and conditions to be met."

In general modern machine accounting has two aspects—one, the special installations for central or high-volume accounting designed to handle mass figures and computations efficiently; the other, the provision of modern general utility machines—adding or calculating—in any office where there is a sufficient amount of work to justify the expense. It is not economy to purchase a machine costing several hundred dollars simply to save a few minutes of work daily to a clerk who is not unduly busy as it is. On the other hand, it is true economy to install a machine—even if it will be used but a portion of the time—if such installation will permit a definite saving in wage outlay or will result in the reduction of costly errors. Moreover, it is well to bear in mind that one modern machine electrically driven may do the work of two manual machines with a corresponding saving in clerical time.

For example, one calculating machine now on the market is provided with mechanisms to bridge over intermediate steps in calculation making one operation out of what with older methods would involve several separate calculations. This machine is driven by a fast motor, operates with a minimum of noise and has many new features, including allowance for fractions to speed up operation and curtail manipulation. Such a machine should be a saver of time and error in any office doing diversified work and an estimate of these savings set off against interest and depreciation should readily show whether the investment would be justified.

Among the many machines available for railroad accounting work should be mentioned the ticket printer, which not only provides additional safeguards against loss and theft but simplifies accounting and saves labor as well. Time recorders to provide time control of employees' labor and payroll distribution and time signaling devices are other installations which may in many instances promote efficiency.

In Next Week's Issue

The oil-electric locomotive has found its principal application in switching operations, and there are now sufficient performance data available to determine, with reasonable accuracy, the extent to which it can profitably be applied to this class of service. An article setting forth the economic advantages of this type of motive power in the railroad yard will be published in next week's issue of *Railway Age*.

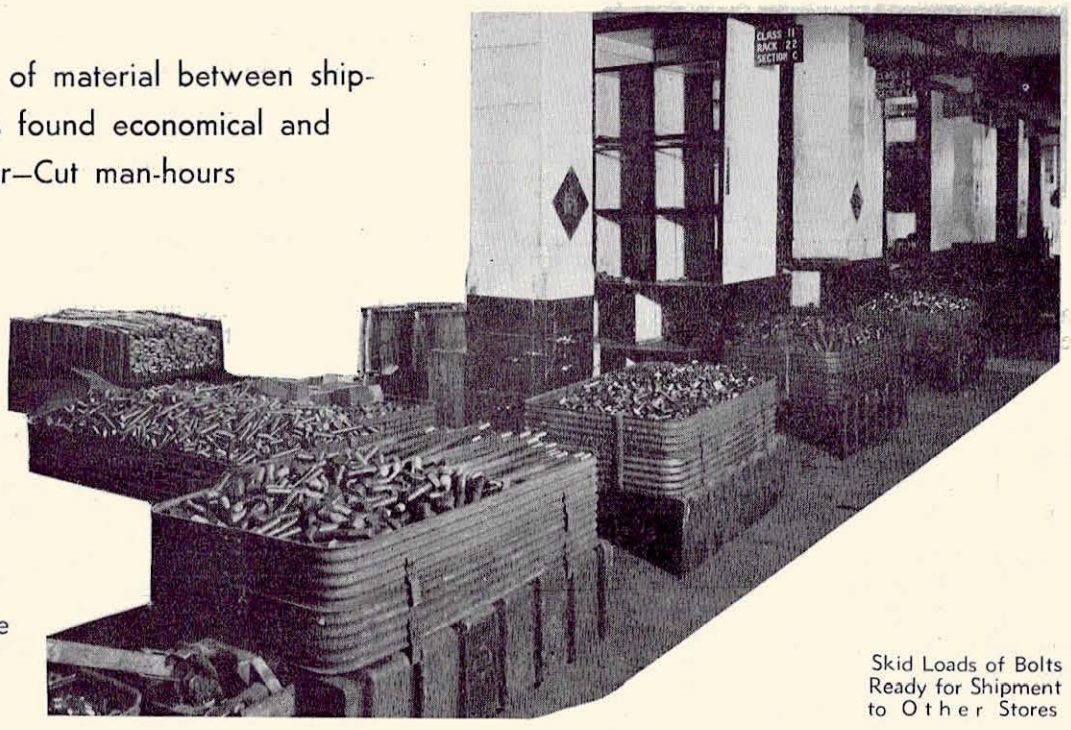
Accountants Alert to Possible Economies

Modernization of equipment is the surest means of keeping an industry up-to-date and able to meet the terrific competition of modern times, while still earning a profit. This is as true of the railroads as it is of other industries. And railroad accounting department officers are fully as able as those of other departments to produce in economies a return upon funds allotted to them for the installation of modern equipment.

Erie Goes to Containers for Supply Work

Skid handling of material between shipping points found economical and safer—Cut man-hours

By A. L. Sorensen
Manager of Stores, Erie



Skid Loads of Bolts Ready for Shipment to Other Stores

FOR some time, the railroads have been seriously considering the problem of reducing the cost of handling materials from the manufacturer to the point of application. The Erie has been particularly interested in this subject, and its adoption of lift trucks and skids for this purpose has produced substantial economies, not only from the standpoint of reduced stocks of material, but also because of the fewer handlings of individual units of material and the fewer accidents resulting from reduced handling.

Equipment Used

All told, the Erie stores and shop forces are equipped with 9 lift trucks, 61 hand lift trucks and 3,697 skids, together with the equipment for handling materials as follows:

	Stores	Shops
Power lift trucks	3	6
Hand lift trucks	32	29
Skids, flat	1,566	902
box	266	844
special	111	8
Tiering boxes	2,000	...
Tractors	2	11
Electric crane tractors	4	16
Power warehouse trucks	4	5
Tractor-trailers	10	135
Auto-trucks	5	...

The former method of unloading cars with checkers and laborers, trucking the materials to the receiving room to be unpacked, tallied and rehandled to various sections of the storehouse has been abandoned. The present practice is to place skids in the car, load the material for each section on separate skids and deliver it direct to the sections, where it is tallied as stocked. This eliminates the intermediate handling. The skid load is delivered by power or hand lift truck, depending on the weight conveyed, store point and the length of the haul. Where material is received from manufacturers or other storehouses on skids, no manual labor is required to pick up materials from the car floors as the loaded skids are delivered direct to their proper destinations.

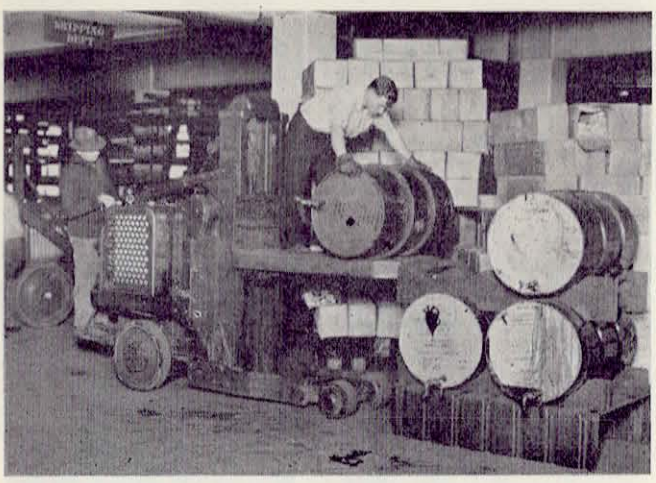
Containers Save Packing

In distributing materials from the main storehouse to their storehouses, skids of the platform type are used for all material not requiring side racks. The items are strapped to the skid with steel tape, which is returned to the general storehouse for re-use. Air pumps are bolted to the skids when shipped, and the lading in the cars is braced where there is any likelihood of the loads shifting during transit.

In addition to the skids, small "tote" boxes are used for shipping such miscellaneous items as bolts, washers, nuts, and locomotive specialty parts. These boxes permit bulk loading and prevent the contents of each box becoming separated. These boxes are filled at the material racks and placed in skids for shipment, after which they are returned to the general storehouse. Distributing the materials in this way eliminates labor and packing costs and reduces substantially the time required to prepare the various orders for shipment.

Ship Repairs Direct from Shops

New mounted air hose, steam hose, repaired triple valves, angle cocks, and other similar material are placed on skids equipped with special racks. These skids are loaded in the shop and, as shipping orders develop, they are taken direct to outbound cars. If there



Method Used in Shipping Drums of Paint and Oil

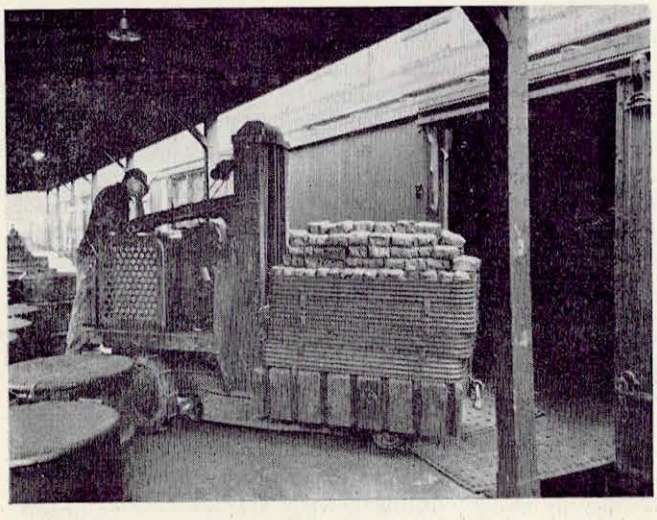
are no orders, the loads are placed in storage. When emptied at their destination, the same skids are loaded with old air hose, steam hose, triple valves and angle cocks, loaded into cars by hand lift trucks and returned to the main storehouse, where the loaded skids are taken direct from the cars to the repair shop.

Scrap springs were formerly trucked by hand from the shop to the loading dock, and, after a sufficient quantity was accumulated, these springs were hand-trucked to the cars for shipment. Assembling a carload of springs for repairs in this way required many man-hours because of the handling involved, but through the use of a portable gas-electric crane and skids, this time has been greatly reduced.

Skids Used as Bins for Borings

At small outlying terminal points, it was the practice to place steel borings in bins. Periodically, these borings were shoveled into a car, and the car was then forwarded to successive points until a carload of borings was collected. Borings are now collected in skids and shipped to one central point where they are dumped into the boring car. This eliminates extra handling and obviates the use of bins.

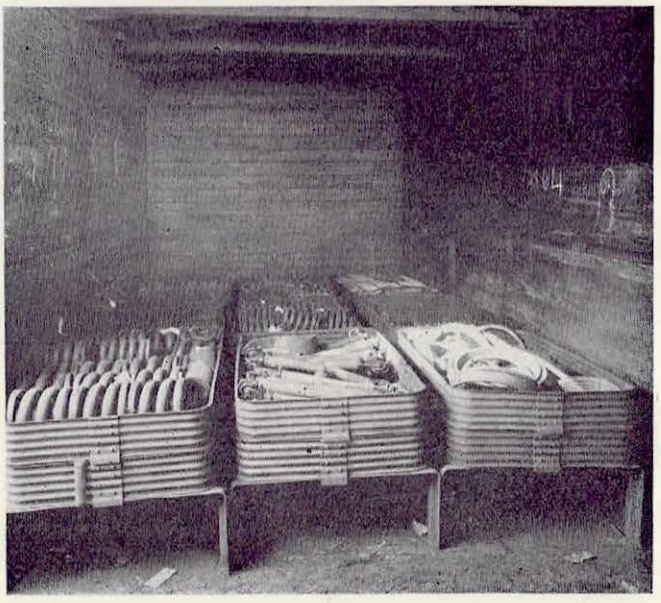
For a number of years, old tools, battery renewals, and other material of this kind were dumped on the floors of cars in the supply train and delivered to the reclamation plant in this condition for unloading and subsequent sorting and trucking to the various repair departments. This handling required an average of 30 man-hours per car. The present practice is to have two cars in the supply train, one of which carries skids for such tools as picks, adzes, mauls, lanterns, lining bars and tongs. The other car has skids in one end for such items as forks, shovels, jacks, joints and signal material, while the other end of the car is reserved for old batteries. When this car reaches the reclamation plant, it is billed direct to the manufacturers without further handling, while the materials on the skids requiring repairs are sent direct to the shop, to be returned with the material as it is repaired.



Small Bolts are Received from Factories in Skids and are Distributed in the Same Skids

Get Bolts from Factory on Skids

Hexagon head engine bolts are now received from manufacturers in skids, sorted according to size, the manufacturer noting the skid number and contents on the billing. Formerly, it required about 28 man-hours to handle a car containing 7,500 bolts, but under the present method, this has been reduced to about one man-hour. Carriage and machine bolts are received from the manufacturers in standard paper boxes placed in skids and are distributed in the same way as the engine bolts. The manufacturer's memorandum of the contents of each skid is maintained as the record for outgoing shipments, and these records are kept up to date by deducting any material sent out.



A Car Loaded with Supplies Packed Loosely in Containers

Journal brasses are also received from the manufacturers on skids, and, as a result, the man-hours re-32 under the former practice to about 2 man-hours at quired to handle a consignment have been reduced from the present time. A chart showing the proper loading of brasses in containers, including the quantity and weight of each size per skid load, has been developed, and so far as practicable, the orders are placed to correspond with this arrangement.

Miscellaneous brasses are also received on skids, the containers being made available for loading at the manufacturers' plants by shipping the old brass borings, rod brasses, bearings and other miscellaneous brass to the manufacturer in skids.

Cut Man-Hours from 20 to 1

Brake shoes are received from manufacturers on skids. The orders are placed on a specified day each

month, and the shipments are made on skids in carload lots. If a carload lot is too much for one point, the requirements of several points are combined to make a carload. In the case of small outlying points which require not more than a skid load or two at one time, the order is filled from the general storehouse and shipped in the weekly material car on the same skids in which the material is received from the manufacturer. Every storekeeper has a list indicating the quantity of each size of brake shoe making a skid load. The receipt of brake shoes on skids in carload lots not only speeds delivery by eliminating man-hours in handling, but it also avoids less-than-carload shipments by manufacturers. The former method of unloading brake shoes required 20 man-hours per car. The entire operation is performed now in about one man-hour.

Deliver to Shops on Skids

Prior to the adoption of the skid method of delivery, shopmen came to the storehouse for the materials they could carry. Considering the many trips required and the time necessary for these trips at the rate paid per man-hour, the expense was substantial. Now practically no shopmen come into the storehouse except to identify materials or for other special reasons. An automatic telephone system has been installed and the shop foreman telephones orders to a receiving man stationed at the storehouse who writes out the order, notes the time of receipt, and the station number to which the material is to be sent, and the material is delivered at 15-min. intervals.

Each department is requested to anticipate its requirements for materials to be used the following morning. These orders are made ready on skids by night attendants, and the materials for the following morning's work are delivered without delay. Materials of unusual dimensions, such as superheater units, flues, and bar iron, which cannot be delivered on skids, are handled by tractors and trailers.

Use Skids in the Shops

To control the movement of materials in and about shops, shop foremen place written orders for the necessary moves in boxes conveniently located along the traffic lines, and these orders are picked up and the work done by the truck operators.

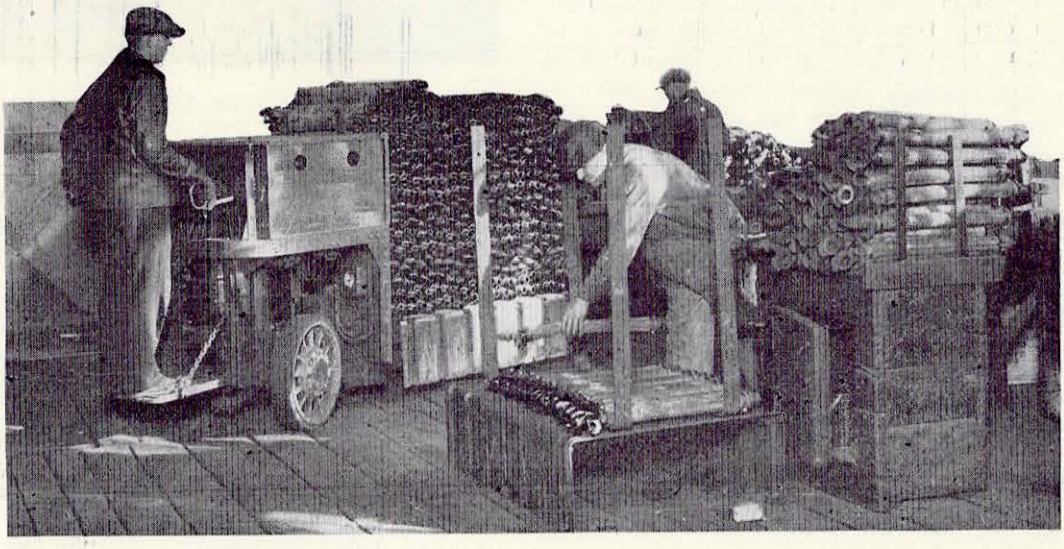
Parts stripped from locomotives are placed in steel baskets, and, after being washed in lye, are moved on skids to the various departments for repairs, and are then returned on the same skids to the locomotive for application. Parts which must be removed and do not require repairs are stenciled with the locomotive number and loaded on skids for storage outside of the shop.

Shop scrap is also handled in skids. At the close of the first shift each day, the scrap pans are carried from various locations in the shop and placed under the crane which dumps their contents into the cars, following which the empty pans are returned to the shop floor.

Mounted trailer wheels were formerly handled from the stripping pit to the end of the shop by an overhead crane operating on a runway leading to the wheel shop where they were moved to the lathe by hand. This required a crane operator and four laborers and consumed about 20 min. per pair. The wheels are now taken from the stripping pit direct to the wheel floor, three per load, by a power truck in about 5 min.

Reduced Handling Saves Time

Cylinders of gas and air were formerly trucked from the storehouse by a two-wheel truck, a mechanic and helper spending 35 min. in procuring two cylinders. At the present time, nine cylinders of air and four cylinders of gas are placed on one skid equipped with a rack and delivered to convenient locations in 20 min.



Shipping Air-Brake Hose Direct from Repair Shop to Outside Points on Skids Saves Many Handlings and Much Time

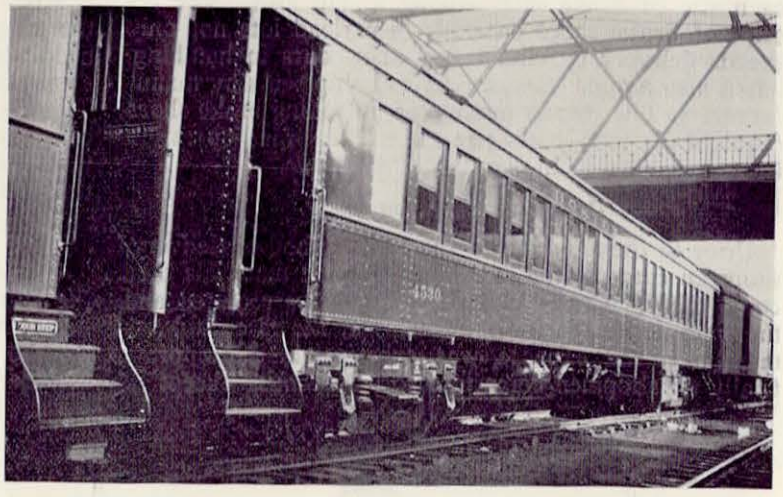
Running boards which were previously handled on two-wheel carts are now handled in complete sets by tractor methods at a saving of eight man-hours per engine.

Previously, cabs, after being removed from locomotives by an overhead crane, were placed on a four-wheel wagon equipped with cross arms, which was pushed by two laborers across the floor to another overhead crane where the cab was picked up and placed on the floor in the cab shop. This operation, which required 30 min. when both overhead cranes were available, is now performed in 6 min. by using a skid equipped with a specially-constructed frame mounted on a revolving plate operated by the truck driver.

Materials such as front-end netting, grates, cab fixtures, spring rigging and motion parts are kept by engine sets in containers and are readily available when required. Engine lagging is delivered from the storehouse to the engine in skids with compartments in which the lagging is separated according to sizes, thus eliminating the inconvenience of opening crates on the shop floor. The old lagging, after being removed from the locomotives, is placed in skid boxes to be returned for reclamation.

Ice Used for Air Cooling in Boston & Maine Coach

Preliminary tests show an inside temperature 12 to 14 deg. cooler than the outside air—Circulating air is dehumidified and filtered



Boston & Maine Coach No. 4530 Equipped for Conditioning Air with Ice

THE Boston & Maine has placed in test service on its line between Boston, Mass., and Portland, Me., a coach equipped for air cooling and air cleaning which has been found in preliminary tests to provide a temperature of from 12 to 14 deg. F. cooler than the outside air. The source of refrigeration is ice, the ice being carried in bunkers beneath the car. Water which is cooled by being sprayed over this ice is circulated by pumps through concealed fin-tube radiator-type coolers at either end of the car. Air, cooled by passing through these cooler units, is then drawn across the car ceiling from end to end, thus lowering the temperature gradually and without draft. The air is automatically dehumidified at the cooling surfaces and is separately filtered. It is kept under slight positive air pressure which prevents outside dirt and dust from entering.

The development of this system was sponsored by the Metropolitan Ice Company, Boston, Mass., and was designed by the R. B. Engineering Corporation, New York, in co-operation with the mechanical department of the railroad. The installation was made by the Boston & Maine. The system consists essentially of two ice bunkers, two blower fans, a circulating pump, two dirt and dust filters, and four coolers of the automobile radiator type.

The following description of the air-conditioning system is abstracted from a paper by Robert T. Brizzolara, president of the R. B. Engineering Corporation, which was prepared for the American Society of Refrigerating Engineers and published in the October, 1931, issue of Refrigerating Engineering.

Conditioning Air With Ice

The conditioning of railway passenger cars, a reality only in the last two seasons, has already resulted in competitive claims for several different systems which have been proposed or demonstrated. The latest development, culminating in experimental runs in the middle of September, seems to stand alone from the viewpoint of meeting the peculiar specifications encountered in this work. They were laid down in this case by C. E. Barba, mechanical engineer, Boston & Maine, somewhat as follows:

Satisfactory atmospheric temperatures and humidities without drafts; light weight in use, with minimum of equipment to be hauled during months when not in use; motivation by existing available generator and battery systems; rugged construction—and absolutely automatic operation. The trainman must run it and he must not be asked to do more than turn on and turn off some switches. The equipment must be inexpensive, and take little space, and be simple enough that the ordinary car shop can install it without unusual supervision. Maintenance after installation must be a minor item.

The combination of ruggedness and simplicity with ready adaptability to various loads, points at the outset to the use of ice, as it melts faster of itself as the load increases. And, of course, ice gets rid of not only control devices and the compressor, but of any refrigerant, and all the troubles of the condenser system, prime movers, cooling tower and what not.

Cooling air with ice directly is not very practical, if you want a uniform result in temperatures. Moreover, the heat transfer is altogether too low or blower power requirements too high. We have accordingly experimented for some time with a plan for maintaining a fixed heat transfer surface, the scheme being to use circulating ice water and to pass the water over the ice, increasing its heat transfer and melting rate. In this

Observed Test Data on Boston & Maine Coach No. 4530, Sept. 9, 1931

Time	10.00 A.M.	11.00	12.00 M.	1.00 P.M.	2.00
Train started 9.30; cooler at 9.47 A. M.					
Outside, wet bulb	65	66	72	76	75
dry bulb	77	80	82	80	85
Other car, d.b.	68–70	70–72	72–85	75–80	75–83
Center test car, w.b.	57	59	62	62	63
(7 ft. 6 in. up) d.b.	65	67	71	72	73
Front conditioner, air entering car, w.b.	48	48	55	56	57
Front conditioner, air entering car, d.b.	52	52	60	60	60
Front conditioner, air entering cooler, w.b.	58	63	64	65	66
Front conditioner, air entering cooler, d.b.	68	75	74	76	76
(Rear conditioner gave closely similar results).					
Level of passengers' head, d.b.					
Left front	70	70	74	76	77
Left center	67	66	70	73	71
Left rear	70	70	74	76	77
Other side closely similar.					
Total amp. used	44	47	..	49	55
Volts	29	30	..	31	30

Ice consumption = 290 lb. per hr.

case the ice was sprayed but not submerged. At the other end must be set up a cooling element of some sort, a metallic heat transfer surface to refrigerate air.

Our plan is somewhat new. The results with it are so successful that they suggest the scheme as one which might have many applications, perhaps even in ordinary refrigerators. Incidental to this is the observation that our ice need be of no special shape, or size, or degree of purity. The likelihood that such a use will become common, combined with the fact that all our skill (and no small part of manufacturing costs) in the ice business has gone into arriving at a particular shape and clearness—create an anomaly with interesting portent.

The Fin-Tube Coolers

When it came to the heat transfer system with air, our first investigation was on an old, and dirty, Ford truck radiator. It has been said that engineers in refrigeration and ventilating know all about heat transfer, and that others, notably the automotive people, know nothing. Not so! We got from the manufacturer excellent data showing the exact performance of these radiators, and used such data in designing the radiators used in this railway car, and in several precoolers also mentioned below. For simplicity, compactness, good performance, and low cost we could find nothing in our own field to compare with them.

Observed Test Data on Boston & Maine Coach No. 4530, Sept. 10, 1931

Time	10.00 A.M.	11.00	12.00 M.	1.00 P.M.	2.00
Train and cooler started at 9.00 A.M.					
Outside, wet bulb	72	75	75	76	77
dry bulb	80	85	85	90	92
Other car, d.b.	82	87	91	92	98
Center test car, w.b.	60	60	67	64	65
(7 ft. 6 in. up) d.b.	71	71	78	76	78
Front conditioner, air into car w.b.	57	60	56	55	57
Front conditioner, air into car d.b.	60	63	60	58	60
Front conditioner, air into cooler, w.b.	64	65	68	66	67
Front conditioner, air into cooler, d.b.	73	74	78	79	79
(Rear conditioner similar.)					
Level of passengers' heads, d.b.	73	73	80	78	80
Left front	..	..	..	..	..
Left center	71	71	78	76	78
Left rear	73	74	80	80	80
(Other side similar.)					

Ice consumption = 418 lb. per hr.

The automobile radiator is a proved rugged device and is tested for 30 lb. per sq. inch working pressure. Besides yielding large areas and surfaces in little space, its unit weight is the lowest of all surface coolers. The initial content of water is a minimum and in railway work using ice for refrigeration the use of this radiator does not require the carrying of extra water tanks for filling. The water area passages in the radiator are so liberal as to make pumping resistance nil. The entire device is of copper. Air resistance through the radiator is slight.

There is also an advantage in the way some air washing is done with these devices. And this means washing 100 per cent of the air circulated. When you look through one of these radiators in operation (where the fins were vertical, although they could be run horizontally) all you see, apparently, is a solid mass of water. This is condensed from the air without extra water, and has a cleaning effect. The air goes through by a circuitous route, occasioned by staggered flat tubes and fin indentations. It appears also that no eliminators were needed for velocities below 250 ft. p.m. This is all due to the use of 6 or 7½ fins to the inch and low air velocities.

The use of this type of heat-transfer device for this particular work, was an important element in its success, and again suggests new possibilities along parallel lines of endeavor.

Space Requirements

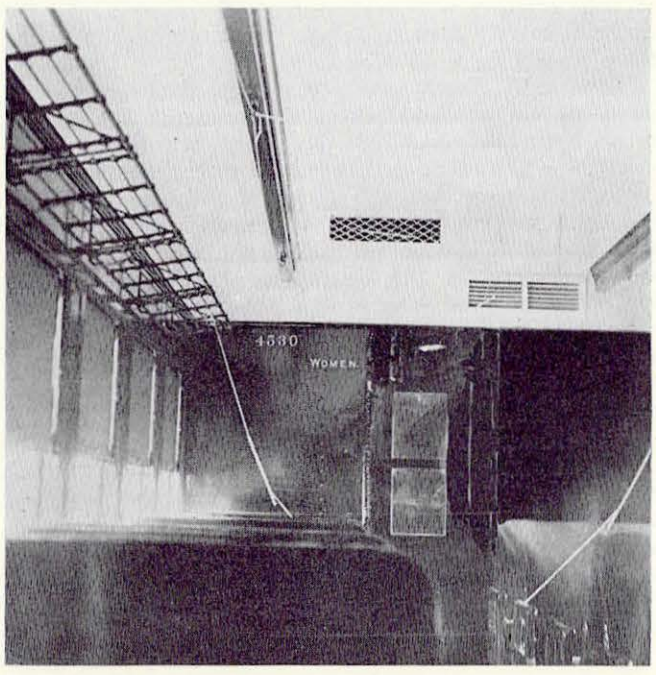
The obvious place to put the ice was at track level. There were built two readily serviced insulated bunkers with shallow water pans or tanks in the bottom. A water pump was also placed below the car.

The water-cooler system was set in two identical compartments above false ceilings at the ends of the car. This space continued out over the platform, in the ceiling of which, at each end, was placed one of the flat dry filters, designed for drawing in fresh air. Each chamber contained two radiators, a blower and motor. The space taken was of no other use; on completion it was ample to hold the equipment, and there was sufficient space to accommodate a man.

The Air-Circulating System

Another fundamental element in the design of this system needs to be mentioned before a detail description of the system and its operation is given. The circulating system works on a general principle that is not common, but it is one of great possibilities for special air conditioning. This principle to maintain rapid circulation over the heads of the occupants, such that the resulting static pressure and relative air densities lets cold air trickle down as it will from the main stream. All air circulated is refrigerated, and the chamber itself is the mixer. Despite discouraging predictions that the system would not work, it did.

The air is discharged at high velocity from one opening, the lower one, while a return-air opening is set almost beside it in the same partition. The air goes the full length of the car, for at the other end, opposite this discharge outlet, is a return opening, and opposite the first return is a discharge outlet. Up one side and



Interior of Coach No. 4530—Cool Air is Discharged Through the Lower Opening—The Opening Near the Ceiling is the Return Air Intake

back the other side—this is the route, with both fans going. The relative paths of air travel are maintained by a blowing as well as a suction action. If one blower stops, or if the speed is lowered, the plan does not work at all. The air falls down and sets up all sorts of air currents. But as planned, it works, without any draft at the level of the passengers' heads, at any part of the car. Matches may be lighted as in still air. Anemometer readings showed clearly that two distinct, ductless, streams were flowing, with the same velocity but in opposite directions.

The schedule of equipment follows:

1 standard 450-ampere-hour Pullman battery.
1 standard 5-kw. Pullman generator.
2 insulated ice tanks, 800 lb. ice capacity each.
1 Gould centrifugal pump with ¾-hp. motor.
2 "Proctectomotor" dry-felt air filters, 45 sq. ft. each.
2 Sturtevant blowers, Type O, 140 c.f.m. ¼ in. with ½-hp. motor.
4 McCord radiators, 24 in. by 18 in. by 3.25 in., 160 sq. ft. each, all copper.

In operation the air circulation system is wide open, with no automatic controls of any sort and no dampers. The amount of outside air depends entirely on the pressure in the car, which is always positive. The trial installation was in a coach of steel construction, with single windows and, of course, no special insulation whatever. The slight pressure keeps air going out through window and door crevices and eliminates dust and smoke infiltrations. This is one of the points in favor of any conditioned car, as far as the comfort of passengers goes. Opening the windows or ventilators of course means more outside air entering through the filters. Thus ventilation is secured in the old-fashioned way, although it was not found necessary in a long run with 24 passengers, six of whom smoked most of the trip. The maximum amount of fresh air drawn in at any time was about 20 per cent. Some mild churning of air between the two opposite streams could be observed in the center of the car above the level of the heads, but it was not of consequence.

The filters were made of aluminum grids covered with a large area of special felt. The cleansing effect of the radiators was evident from the clear air in the car with several men smoking. With 60 passengers the same results were noted.

Two of the tables give actual logs of observed data including the ice and power requirements for a five- to six-hour run on a cool day and a warm day.

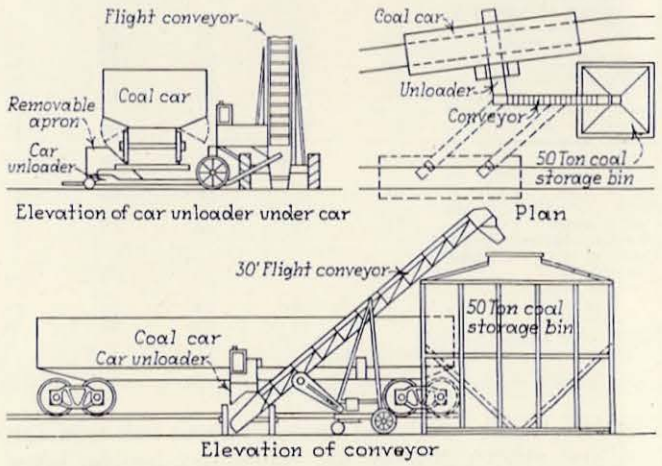
There was no car precooling on any preliminary attention whatever, and the system was not started until the train was under way. The results were not obtained in anticipation of publication nor as an ideal demonstration, as the attendants experimented with louvres, fan speeds and water flow to the degree that the temperatures are not especially uniform. Neither were they as high as the public required for comfort! However, we found it quite practicable to have a "controlless" car after a fixed setting of all equipment is made. Its satisfactory performance will be improved by the installation of a thermostatic control on the ice-water supply line. We ran temperatures that were 10 to 16 deg. F. lower than those that prevailed outside and 14 to 19 deg. F. lower than those in other cars of the same train. The humidities were quite within those ordinarily required in conditioning work of any sort.

Runs between Boston and Portland have been made with 60 passengers in the car, maintaining 16 deg. F. lower temperatures than outdoors. The ice consumption averaged 600 lb. of ice per hour, a refrigerating rate of 7.5 tons.

Installs Portable Coaling Equipment

A PORTABLE coal-handling plant is being used with considerable success by the Chicago, Burlington & Quincy at Guernsey, Wyo., a division point, where three types of fuel are handled but where the quantities are not sufficient to warrant the installation of large-capacity permanent equipment. Locomotives burning oil, bituminous coal, and lignite are fueled at this point, the latter fuel having been introduced relatively recently. A coal chute was already in operation for the delivery of bituminous coal to locomotives. The new installation, therefore, was introduced as a means of fueling the lignite-burning locomotives which are now being used more extensively in the west.

The new plant consists of a heavy-duty car unloader and a power-operated flight conveyor, both built by the



Sketch Drawings of the Equipment at Guernsey, Wyo.

Barber-Greene Company, Aurora, Ill. The car-unloading unit was installed under a side track which was already elevated 2 ft. 6 in. above the ground level. When a hopper-bottom car is spotted above the unloader and opened, the machine discharges the coal into the hopper of the 30-ft. flight conveyor which, in turn, elevates it at an angle of 40 deg. and discharges it into a storage bin approximately 50 tons capacity, which was built by the railroad. This storage bin was so located as to utilize space that was obtainable without extensive alterations to existing facilities. Cars are unloaded at the rate of two tons per minute.

For loading locomotive tenders from the bin, the portable car unloader is removed from the track pit and placed under the base of the storage bin. The flight conveyor is turned around under its own power so that its hopper receives the discharge from the unloader, and in this position it carries the lignite to the tender.

BLIND PASSENGERS who have with them dogs, trained as leaders, may take the dogs with them into passenger cars, on the Pennsylvania. This is announced in a recent circular issued by President Atterbury, the only condition being that every dog shall have a traveling permit from the American Foundation for the Blind, which permits are based on rigid tests prescribed in connection with the education of dogs.

Trade Commission Issues Order in Waugh Equipment Co. Case

Federal body finds use of Armour traffic in soliciting railroad business

"Oppressive and coercive" and orders that it cease

WASHINGTON, D. C.

PRACTICES of the Waugh Equipment Company and officers of Armour & Co., who were among its stockholders in using the Armour traffic as a lever for selling draft gear and other equipment to railways were roundly condemned in a report made public by the Federal Trade Commission on October 12 accompanied by an order directing the company, Arthur Meeker and Frederick W. Ellis, their agents, representatives and employees, to cease and desist such practices in solicitation of railway business. Respondents were described as having "created and taken advantage of a competitive weapon, oppressive and coercive in nature" and the commission issued a finding that the practices "are to the prejudice of the public and respondents' competitors, are unfair methods of competition in commerce" and constitute a violation of Section 5 of the Federal Trade Commission act. The report and order were dated September 21, and follow an extensive investigation undertaken by the commission under a complaint issued on June 9, 1928. Arthur Meeker was formerly vice-president of Armour & Co., and Mr. Ellis is vice-president in charge of traffic.

A similar case, involving the Mechanical Manufacturing Company and officers of Swift & Co., is still pending before the commission awaiting oral argument which has been postponed.

The order to cease and desist refers to solicitation of business by the following methods:

"(a) By promises and assurances of freight traffic to be shipped over the lines of said railway companies by Armour & Co., and/or its subsidiary corporations, or any other shipper of a substantial volume of freight traffic;

"(b) By promises and assurances of an increased volume of freight traffic to be shipped over the lines of said railway companies by Armour & Co., and/or its subsidiary companies, or any other shipper of a substantial volume of freight traffic; and/or

"(c) By threats of withdrawal of traffic from the lines of said railway companies by Armour & Co., and/or its subsidiary corporations, or any other shipper of substantial volume of freight traffic if said railway companies would not purchase draft gears or other railway equipment manufactured and/or sold by respondent corporation."

Respondents Arthur Meeker and Frederick W. Ellis are also ordered to cease and desist "co-operating with and assisting the respondent corporation, its officers, agents, and employees, in the sale and distribution of its draft gear and other railway equipment in interstate commerce to railway companies by utilizing their official positions in Armour & Co., to induce or compel officials of railway companies to give undue preference to draft gear or other railway equipment manufactured and/or sold by respondent corporation by means of promises of freight traffic from said Armour & Co., and/or its subsidiary corporations and threats of withdrawal of said traffic if said railway companies would not purchase draft gear or other railway equipment manufactured and/or sold by said Waugh Equipment Company."

Respondents also are directed individually and severally to file with the commission within 60 days a report in writing setting forth in detail the manner and form in which they have complied with the order to cease and desist.

The report includes nine findings of fact, of which paragraph 9 is as follows:

"The aforesaid acts and things done by respondent Ellis, Meeker and the respondent corporation, Waugh Equipment Company, are all to the injury of the public and competitors of respondent corporation, and unduly tend to suppress competition between respondent corporation and competing manufacturers of draft gears, and to create a monopoly in the respondent corporation in the sale and distribution of draft gears and other railway equipment, in that the respondent corporation, cooperating with respondents, Meeker and Ellis have created and taken advantage of a competitive weapon, oppressive and coercive in nature, which prevents the customers to whom the respondent corporation and its competitors are trying to sell their products, from exercising their free will and judgment in determining which device is the most efficient and will best serve their needs at the lowest net cost over a period of time, and has thus injected an element in the competitive field in which respondent corporation is engaged, which is unfair and abnormal, and tends to reduce the efficiency and economy in the production and sales methods of competing manufacturers and gives to the concern that controls the largest volume of freight traffic and unfair advantage that will more than offset the higher efficiency in the production and sales methods of competing concerns which control no such traffic, and force all competitors either to abandon the draft gear field, or, to compete by gifts of stock or other valuable consideration to employees of corporations controlling and directing heavy volumes of traffic unrelated to the draft gear industry, and thus hinder and restrain the freedom of competition in the natural, customary and prevailing channels of trade in the draft gear industry."

Other extracts from the findings are:

Sometime between June and September, 1924, the exact date not being determined, A. J. Pizzini and T. E. Bragg, promoters of the respondent corporation, divided their promotion stock of the Waugh Equipment Company, and gave one-third of that stock or 1,666 shares of common stock to respondents, Arthur Meeker, F. W. Ellis and J. B. Scott—666 shares going to Meeker, 666 shares to Ellis and 334 shares to Scott, as consideration for an agreement or understanding entered into by and between respondents, Arthur Meeker and F. W. Ellis and Messrs. Pizzini and Bragg, promoters of the respondent corporation, whereby respondents Meeker and Ellis agreed and promised to use their influence acquired through long years of contact with railroad officials, and particularly the influence of respondent Ellis, to advance the interest of the respondent, Waugh Equipment Company, by obtaining hearings for officers or salesmen of that company, when necessary, and further, to use their influence with the officials of the railroads, particularly the traffic officials and through them the executive and other departmental officials of the railroads, to solicit and secure orders for the draft gears sold by the Waugh Equipment Company. The influ-

ence which they agreed to exert was that influence which had been acquired, and was then, and is now, possessed by them by virtue of the large volume of competitive traffic of Armour and Company and its subsidiaries, which traffic had been for years and was at the time of the making of this agreement, and is now, controlled and directed by F. W. Ellis.

Said agreement or understanding was entered into by respondents Arthur Meeker and F. W. Ellis without the knowledge of other officials and stockholders of Armour & Company, except F. Edson White, President of said corporation.

On or about February 2, 1927, T. E. Bragg sold his one-third share in the promotion stock of the respondent corporation, Waugh Equipment Company, amounting to 1,666 shares for $40,000 cash, the purchasers of said stock being the Whitehouse Investment Company, an investment trust created and controlled by F. Edson White, President of Armour & Company for the benefit of his family, which purchased 1,000 shares, respondent Meeker who purchased 266 shares, respondent Ellis who purchased 266 shares and respondent Scott who purchased 74 shares. Subsequently, respondents Meeker and Ellis have made additional purchases of the Common Stock of the respondent Corporation, Waugh Equipment Company, until the record as of May 1, 1930, shows respondent Meeker owns 57 shares of preferred stock and 1,069 shares of common stock of said corporation and respondent Ellis as of record May 1, 1930, owned 1,069 shares of common stock in said corporation.

Just prior to December 1, 1929, the total holdings of employees and officials of Armour & Company, including respondents Meeker, Ellis and Scott, was 3,749 shares of common stock out of a total of 7,000 shares outstanding. On or about December 1, 1929, respondent corporation, Waugh Equipment Company, increased its outstanding capital stock to 8,666 shares, issuing the additional 1,666 shares to George A. Hood, trustee for the heirs of the late G. F. Swift, generally known as the "Swift Estate," substantial owners of capital stock of Swift & Company, Chicago, meat packers, in exchange for an assignment of a license to manufacture a centering device which was owned by the Mechanical Manufacturing Company, a corporation at that time engaged in the manufacture and sale of draft gears and which was controlled by the Swift Estate. Therefore, subsequent to December 1, 1929, officials and employees of Armour & Company owned 3,749 shares of common stock, and officials and employees of Swift & Company owned 1,666 shares of common stock of a total outstanding issue of 8,666 shares of common stock—the remaining shares being principally owned by A. J. Pizzini, President of the Waugh Equipment Co.

Respondents Meeker and Ellis, cooperating with the officials and employees of the respondent corporation, Waugh Equipment Company, beginning in the year 1924 and continuing through the year 1929 used the large volume of traffic of Armour & Company and its subsidiaries, under the direction and control of respondent Ellis, to induce and compel various railway companies of the United States to purchase draft gears manufactured and sold by the respondent corporation in preference to draft gears of equal or higher quality manufactured and sold by competitors, by giving the traffic officials of said railway companies, directly or indirectly, promises and assurances of freight traffic to be shipped over the lines of said railway companies by Armour & Company, and its subsidiary corporations, if said railways would purchase draft gears manufactured and sold by the Waugh Equipment Company; also by giving the traffic officials of said railway companies, directly or indirectly, promises and assurances of, and in some instances by actually furnishing, an increased volume of freight traffic to be shipped over the lines of said railway companies by Armour & Company and its subsidiary corporations, if said railways would purchase draft gears manufactured by the Waugh Equipment Company; and also by threats of withdrawal, and the actual withdrawal, of freight traffic from the lines of certain railway companies by said Armour & Company, and its subsidiary corporations, if and when said railway companies would not purchase the draft gears manufactured by the Waugh Equipment Company.

Despite the fact that respondent corporation, during the period of time from August, 1924, until the year 1929, was manufacturing and selling a practically unknown gear, in competition with * * * competitors, well established in the industry, it succeeded in forging ahead of all of them from a place of obscurity when it sold less than 1% of the total draft gears for new freight equipment in 1924 until in 1929 it sold approximately 25%, and in 1930, approximately 35% of the draft gears sold for new freight equipment to the railroads of the United States.

The ordinary procedure followed by the * * * competitors of the respondent corporation, in the sale and distribution of draft gears to the railroad companies before the advent of the respondent corporation, and at the present time is to first attempt to sell the product to the mechanical department of the railroad and then to solicit the operating and purchasing officials. No contact is made with the traffic department. After the mechanical officials have placed the gears in the specifications for new equipment, the purchasing department of the railway companies usually called upon the draft gear manufacturers for bids. There is substantial evidence in the record to show, however, that due to the activities of respondents Ellis and Meeker described in many instances the specifications of the mechanical department of the railroads were broadened to include gears manufactured by the respondent corporation, contrary to the recommendation of the mechanical officials and purchases were made of said gears regardless of the bids of competitors.

The factors ordinarily taken into consideration by officials of the railroad who purchase draft gears before the advent of the respondent corporation were—first, quality of the product, second, price of the product and third, salesmanship. The draft gear companies named in this paragraph, competitors of the respondent corporation, do not have any appreciable traffic to offer as an inducement to railroad companies who purchase their gears, and are therefore unable to meet the competition of the respondent corporation as described, and their gears as a result have been displaced on a number of railroad lines by the product of the respondent corporation.

The president of one competitor testified that the decline in his company's sales of gears to the railroad companies was due to the extreme competition of the respondent corporation and one other concern by the use of traffic which he didn't have. He named the respondent corporation as the principal offender in this respect, particularly on the Missouri Pacific, Seaboard Air Line, and the Rock Island roads. He also named the Missouri-Kansas-Texas, the Chicago, Milwaukee, St. Paul & Pacific, the Boston & Maine, the New York, New Haven & Hartford, the Lehigh Valley, the Delaware, Lackawanna & Western and the Chesapeake & Ohio, as other railroads where this type of competition on the part of the respondent corporation had been encountered.

The president of another competing draft gear manufacturer testified that the loss of business by his company in 1929 was caused to some extent, by what he termed "traffic conditions"; that he had found it necessary to attempt to overcome traffic consideration on the part of some competitors, naming the respondent corporation and one other concern (The Union Draft Gear Company).

The vice president of one of the largest manufacturers of draft gears and one of the oldest in the industry, testified that his firm had lost business and sales had been reduced in 1929 as compared with previous years due to "various competitive conditions which had not been effective in earlier years—notably traffic." He explained this statement as follows: "I mean the urging of railroad officials to consider specialties in consideration of traffic which might be given to the railroads who are contemplating the purchase of this new equipment." He named the respondent corporation and the Union Draft Gear Company, as competitors who were using traffic as outlined by him to solicit business from the railroads, particularly on the Chicago & North Western road.

Officials of other competitors, while admitting that they had lost business to the respondent corporation, and had keenly felt its competition, would not attribute the loss of their business to the use of traffic on the part of respondent corporations.

* * *

Nickel Plate Bridge over the Kankakee River at Knox, Ind.

Steam, Electric, and Internal Combustion Locomotives

Inherent characteristics give each type of motive power a definite field of usefulness

By E. B. Walker

General Superintendent, Montreal & Southern Counties Railway

THERE are three types of locomotives in common use today; steam, electric, and internal combustion engine. The steam locomotive has been in active service for 100 years, the electric locomotive for approximately 50 years and the internal combustion engine locomotive is of comparatively recent development. Each has its special characteristics and is best adapted to a certain field of application. Any class of regular railway service can be operated by any of the three types, but a study of their chief characteristics shows that the economic range of each is limited to certain distinct fields.

Characteristic speed-tractive-force curves of three locomotives, each with 70 tons on the drivers, are shown in Fig. 1, and the horsepower available at the wheel rim in each case is shown in Fig. 2. A study of these curves indicates immediately the following general characteristics:

1. The steam locomotive has its maximum horsepower available at the higher speeds.
2. The electric locomotive has its maximum horsepower available at slow speeds.
3. The internal-combustion locomotive has approximately the same horsepower available at all useful speeds, depending on design of electrical equipment.

These inherent characteristics at once indicate why such trains as the Twentieth Century Limited and the International Limited are propelled by steam locomotives and probably will be for many years to come, and why such railways as the Norfolk & Western and the Virginian have been electrified, although they are adjacent to a plentiful coal supply, and they also indicate why the most useful field of the internal-combustion locomotive is in switching and slow-speed service.

The characteristics of an electric locomotive are subject to greater variation than either of the other two; for instance the locomotive referred to in Fig. 1 has six economical operating speeds for any given tractive force. This is obtained by various combinations of motors and field taps with the result that the same locomotive can function equally well for yard switching and as a road locomotive.

This flexibility in the electric locomotive makes it the best type for switching service as maximum tractive force, acceleration and speed may all be obtained in the one machine. The electric locomotive, however, can be economically used only where there is sufficient density of traffic to justify the capital cost of substations and overhead. There are many instances where density of traffic is not sufficient to warrant the capital cost of electrification, and others where overhead or third rail contact systems are practically impossible to construct owing to local conditions, and there are many complaints

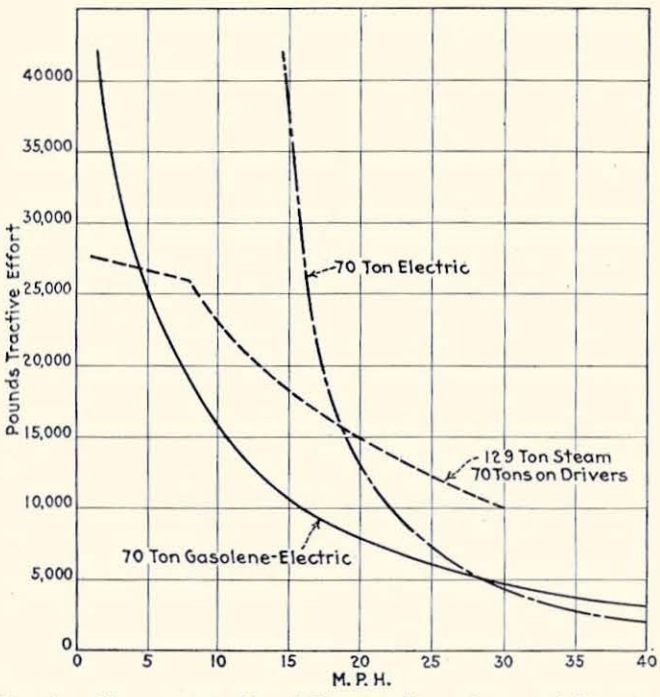


Fig. 1.—Characteristic Speed-Tractive-Force Curves of Electric, Steam and Gasoline-Electric Locomotives, Each Having 70 tons on Drivers

in warehouse areas of locomotive smoke. For any of these conditions the internal-combustion locomotive has established itself as a useful substitute for the steam switching engine.

The curves shown in Fig. 1 and Fig. 2 indicate that switching is the least economical phase of steam locomotive operation. We are so accustomed to see the steam switching locomotive in every railway yard that we are apt to forget how unsatisfactory this unit is from the point of view of thermal efficiency. Switching requires high starting tractive force and acceleration and low running speed most of the time. In order to acquire the first characteristics, the engine must have a maximum horsepower capacity far in excess of the actual horsepower requirements of the work. The curves in Fig. 2 indicate the wide difference in maximum horsepower available between the steam and the internal-combustion locomotive, and at the same time show that the latter with far less maximum horsepower can be designed for much better starting tractive force and acceleration at low speeds. Actual tests made on a steam switching locomotive show that the overall thermal and mechanical efficiency was about 1¼ per cent during its working hours, and when stand-by losses over 24 hours are

considered, the efficiency was less than one per cent. These figures indicate that a more expensive type of fuel than coal can be used, and it is on this account that the internal combustion locomotive has had a chance to function in spite of its higher first cost, its greater complexity and its higher priced fuel.

The two types of internal-combustion locomotives which can be said to be successful in railway yard operation are the Diesel-electric and the gas-electric.

The mechanical drive is quite successful in small units for intermittent service, but cannot compare in reliability and ease of operation with the electric drive for continuous service.

The outstanding difference between the Diesel-electric and gas-electric locomotives is that the former has a higher thermal efficiency and uses a much cheaper fuel. Actual operating results have shown 400 ton-miles per Imperial gallon for a Diesel-electric car with trailer, and

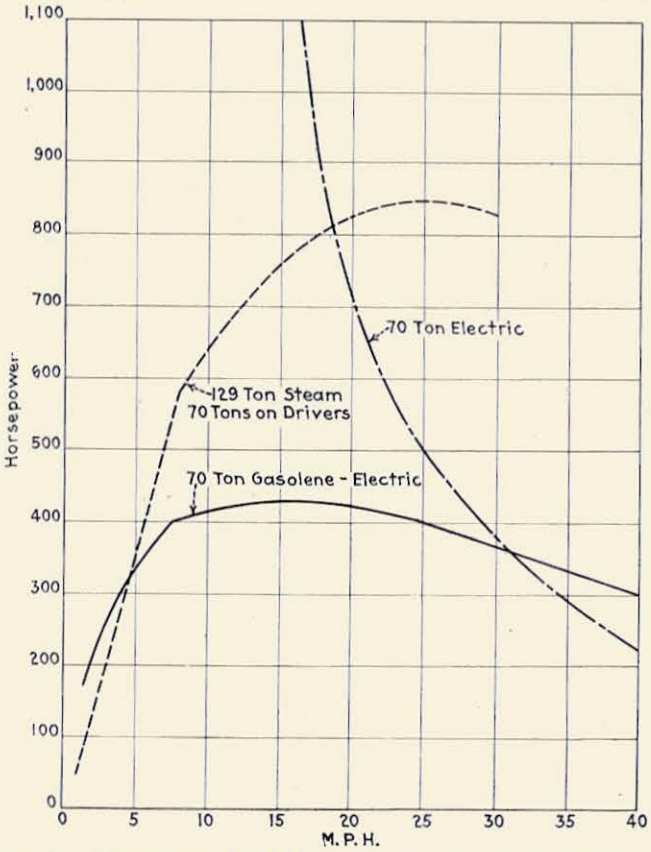


Fig. 2.—Horsepower Available at Various Speeds For Electric, Steam and Gasoline-Electric Locomotives, Each Having 70 tons on Drivers

150 ton-miles per Imperial gallon of gasoline for a gas-electric locomotive. Both these figures are for continuous runs and, of course, would be much lower for switching service. This marked difference in fuel cost would at first seem to rule out a gas-electric locomotive for any continuous operation. However, there are compensating advantages for the gas-electric, the chief being its low first cost, with simple and inexpensive maintenance.

Many operating statements omit interest and depreciation, those being included in the final financial statements, and this practice makes the Diesel-electric locomotive appear to much greater advantage than is actually the case. The fact that it is a very expensive unit means high annual charges, and the inclusion of these figures in the operating statement presents quite a different picture in the actual financial results.

The two locomotives illustrated in Figs. 3 and 4 rep-

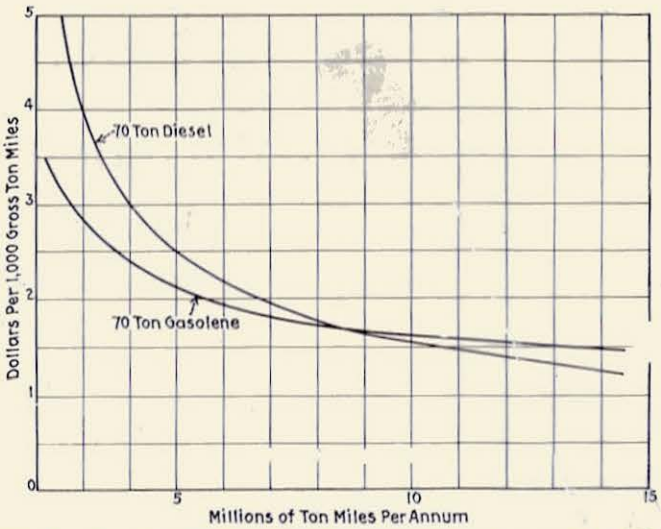


Fig. 3.—Comparative Costs of Operation (Amortization in 15 Years) of a 70-ton Diesel-Electric and a 70-ton Gasoline-Electric Switching Locomotive

resent satisfactory examples of each type in actual service. The Diesel locomotive is a 70-ton unit operating in Canadian National yards near Montreal. As it operates 24 hours a day with three shifts, the conditions are ideal to obtain economical results. The second locomotive is a gas-electric operating on a subsidiary railway of the Canadian National. This locomotive has an intermittent service to perform throughout the day, with many idle periods. This is an ideal condition for the gas-electric. It saves fuel, where a steam locomotive would have to maintain steam pressure, and it saves interest charges when idle, as compared with a Diesel locomotive. The data from which the curves shown in Figs. 3 and 4 have been based are obtained from the operating results of these two locomotives corrected for the same weight and duty. With this in view, estimates have been made comparing the operation of a 70-ton Diesel-electric with a 70-ton gas-electric and curves shown in Figs. 3 and 4 show cost in dollars per 1000 gross ton miles based on varying total annual loadings. This cost in dollars does not include all the operating charges, but does include the variables which are different for the two machines, as follows:

1. Interest at 5 per cent.
2. Amortization: the curve in Fig. 3 being for 15 years and Fig. 4 for 20 years.

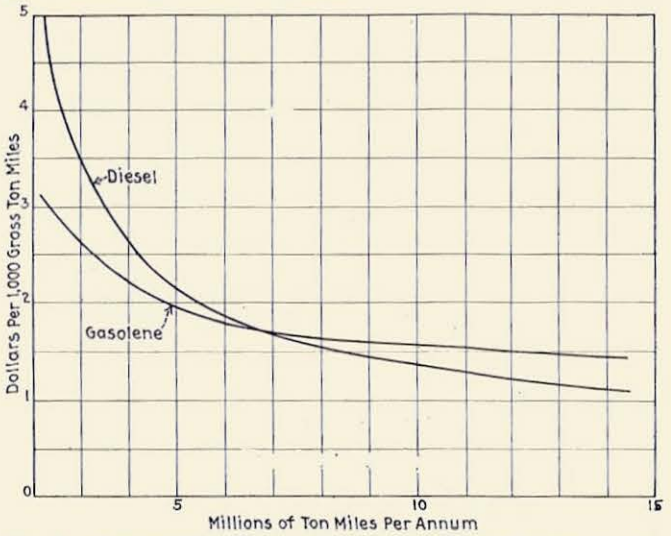


Fig. 4.—Comparative Costs of Operation (Amortization in 20 Years) of a 70-ton Diesel-Electric and a 70-ton Gasoline Electric Switching Locomotive

3. Fuel and lubricating oil.
4. Locomotive maintenance.

These curves indicate that for the given conditions the Diesel-electric has the advantage for traffic averaging more than from 7 to 9 million ton-miles per annum, and that for lighter loads the gasoline-electric has the advantage. It must be remembered that these curves are based on certain definite existing operating conditions, and that they will vary with every location; the price of Diesel oil compared with gasoline, the availability of skilled mechanical labor, the continuity of the operation—all will change the shape of the curves. Each operator should compare his own statement of conditions as they exist in his own locality.

In view of the serious reduction in traffic all over North America at present, the advantage of the cheaper unit becomes apparent. An inspection of curves 3 and 4 shows that the loss in the case of heavy traffic by operating a gas-electric locomotive is not very great, while if traffic falls off to any serious extent, the owner of the gas-electric locomotive has a smaller investment on which to pay interest and depreciation.

From the same standpoint it must not be forgotten that, if the work is continuous but is performed during but one shift per day, the steam locomotive may be the most economical of all. The steam locomotive is usually already available and no added interest on the investment has to be charged against its operation, whereas unless there is some other job for the steam locomotive, its interest charges cannot be credited in the case of a substituted internal-combustion locomotive.

As an interesting example in the writer's experience, the case of a small terminal switching road employing one steam locomotive might well be mentioned. In this instance an energetic salesman was propounding the savings to be expected by the use of a Diesel-electric locomotive which was to cost $60,000. Investigation showed that the total operating costs of the terminal railway, including wages, were only $10,000 a year. It is hard to comprehend how anybody with a real understanding of the cost of operation could expect to earn interest and depreciation on a $60,000 investment out of the savings to be made on $10,000 per annum operating charges. This was only another case of the usual misplaced enthusiasm over a machine which is, undoubtedly, successful where it is properly applied.

In studying the application of an internal-combustion locomotive consideration should be given to the use of one- or two-engine units. Each arrangement has its particular advantages depending partially on the class of service.

From the first cost standpoint the single engine unit is cheaper; this is particularly so in the case of the Diesel engine. In the case of the gasoline engine, two engines of half the power are often cheaper than one engine on account of quantity production, but any saving effected in this way is generally more than offset by the duplication of the electrical apparatus.

Apart from first cost, the two-unit locomotive has marked advantages. In the first place, many "duty cycles" include periods when the work to be done is light and in such cases one engine may be sufficient. This makes it possible to reduce fuel consumption for light loads by operating one engine at a higher percentage of its full load rating. In the second, there is the advantage of making it possible to operate the locomotive in the event of the failure of one engine. Control apparatus can be designed to give either full tractive force at half speed or half tractive force at full speed with only one engine operating.

In considering thermal efficiency under light load it should be remembered that the Diesel engine maintains its efficiency at low loads to a greater extent than the gasoline engine, and that, therefore, the advantage of two-engine units is not so marked from the standpoint of economy in the case of the Diesel engine. In this connection it must be remembered that the idling losses of the Diesel engine are higher than those of the gasoline engine, as it cannot be throttled down to such an extent. Also, the gasoline engine can be started and stopped more easily, and if the operator is trained to pay attention to this point, a considerable fuel saving can be made by stopping the engines for any delay of more than a minute or so.

An eminent engineer once stated that no engineer was worth his salt who could not put the dollar sign on his work, and the purpose of this article is not to recommend any particular form of locomotive, but rather to encourage the operating man to cast a set of figures representing as nearly as possible his own conditions and then to decide in dollars and cents which is the most economical method of handling his problem. A railway is largely a transportation machine, and in the back of the operator's head should always be cost per ton-mile.

Santa Fe Completes A Complicated Bridge Job

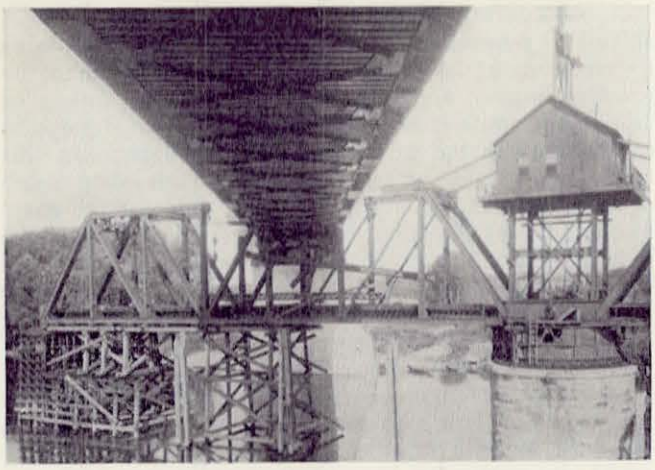
BECAUSE the underside of a truss span on a new high-level line failed to clear the top of a truss span on the old low-level line which is replaced, the Atchison, Topeka & Santa Fe was confronted with an interesting bridge erection problem in connection with its project for a new line across the Illinois river at Chillicothe, Ill.*

The new line is on an independent location, but to meet the requirements of the most favorable alinement the new line crosses the old line at an angle of 20 deg. 24 min. at about the middle of the river, although at a considerably higher elevation. Base of rail level on the new bridge is about 31 ft. above rail level on the old bridge. The new superstructure consists, for the most part, of five double-track deck truss spans ranging from about 200 to 244 ft. in length, but across the navigable channel it was necessary to provide a 446-ft. through truss span, affording a clear waterway of 364 ft. measured at right angles to the channel. This span was so located that the supporting piers would not foul the swing circle of the old draw span, but the new span, in its final position, would have fouled the top of the old draw span by a vertical distance of three feet.

To overcome this difficulty, the 446-ft. span was erected 4 ft. above its final elevation, the bearing shoes being placed on timber grillages on the bridge seats. Falsework for erection purposes could not be employed for the same reasons and it was necessary to use the cantilever method in placing the long span, which was completed several weeks before the track work on the approaches was finished.

The new line was then ready for operation except that the track on the channel span was four feet above grade, and this span could not be lowered without a partial dismantling of the old draw span. Furthermore, the latter operation had to be carried out without blocking the channel so there was no alternative but to do

* This project was described in an article in the *Railway Age* of April 4, page 671.



How One Leaf of the Old Swing Span Was Cut to Permit the New High Level Span to be Lowered Four Feet

this while the span was in the open position. This meant that the line would be out of service from the time the old span was opened until the new span was at final elevation. On July 15, the day set for its change, the draw span of the old structure was swung to the fully-open position at 6:30 a.m. and blocked up on the rest pier and on several bents of falsework which had been driven to support it. Enough of the members of the draw-span truss to clear the new channel span were then burned off and were lowered to the bridge floor. The new 3,700-ton span was lowered by means of eight 500-ton hydraulic jacks. These were placed in pairs under each corner of the span resting on grillages of rails and bearing on the underside of the end floor beams. There are heavy double-web box section beams that had been designed for this purpose.

Owing to the fact that the jacks had to be reset and run out several times with corresponding changes in the grillages, both under the bridge shoes and the jacks, the lowering operation required 5 hr. and 50 min., namely, from 8 a.m. to 1:50 p.m. when traffic was restored. The interruption in the use of the line was during a time of the day when it resulted in a minimum interference with traffic, only one local passenger train being scheduled to cross the bridge during those hours.

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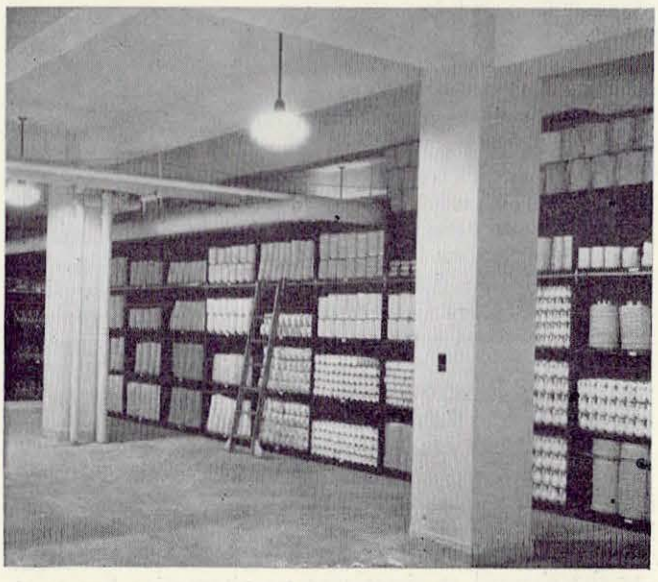


One of the Rooms in the New Commissary of the New York Central

Freight Car Loading

WASHINGTON, D. C.

REVENUE freight car loading in the week ended October 3 amounted to 777,837 cars, which represents the heaviest loading for any week so far this year and also an increase of 39,808 cars as compared with the week before. Until this week the peak loading for the year was in the week of May 2, when the total was 775,291 cars. Last year the peak was in the week of August 29, when the total was 984,504 cars. As compared with the corresponding week of last year the loading in the week of October 3 shows a decrease of 193,418 cars, and as compared with 1929 the decrease was 402,110 cars. Miscellaneous loading showed an increase of over 18,000 cars as compared with the week before and coal loading showed an increase of over 13,000 cars. The summary, as compiled by the Car Service Division of the American Railway Association, follows:

Revenue Freight Car Loading

Week Ended Saturday, October 3, 1931

Districts	1931	1930	1929
Eastern	175,116	210,641	261,814
Allegheny	145,364	190,002	231,179
Pocahontas	50,553	54,702	64,629
Southern	109,159	136,539	152,175
Northwestern	108,292	142,223	182,047
Central Western	122,066	154,543	186,594
Southwestern	67,287	82,605	101,509
Total Western Districts	297,645	379,371	470,150
Total All Roads	777,837	971,255	1,179,947
Commodities			
Grain and Grain Products	37,731	42,573	49,549
Live Stock	27,609	30,165	36,159
Coal	141,957	167,868	202,557
Coke	5,719	8,766	12,156
Forest Products	25,716	41,552	60,690
Ore	27,724	41,430	65,908
Mdse L.C.L.	219,097	244,843	272,999
Miscellaneous	292,284	394,058	479,929
October 3	777,837	971,255	1,179,947
September 26	738,029	950,663	1,203,139
September 19	742,628	952,561	1,167,395
September 12	667,750	965,813	1,153,274
September 5	759,546	856,649	1,018,481
Cumulative total, 40 weeks	29,343,825	36,124,956	41,099,973

The freight car surplus for the week ended September 30 averaged 564,284 cars, a decrease of 6,289 cars as compared with the week before. This included 293,424 box cars, 209,765 coal cars, 24,551 stock cars and 11,430 refrigerator cars.

Car Loading in Canada

Revenue car loadings at stations in Canada for the week ended October 3 totaled 56,027 cars, an increase over the previous week of 5,702 cars and a decrease from the same week last year of 14,805 cars.

	Total Cars Loaded	Total Cars Rec'd from Connections
Total for Canada		
October 3, 1931	56,027	22,289
September 26, 1931	50,325	21,724
September 19, 1931	53,794	22,309
October 4, 1930	70,832	31,661
Cumulative Totals for Canada		
October 3, 1931	1,942,188	1,029,741
October 4, 1930	2,449,032	1,338,002
October 5, 1929	2,739,170	1,653,188

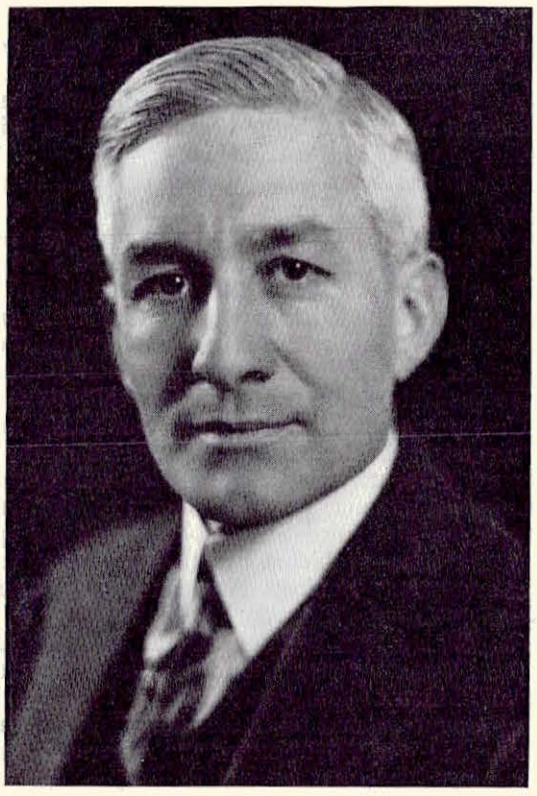
THE NEW YORK EVENING POST, quoting from its files of October 13, 1831, says: "The directors of the Baltimore and Ohio Rail-Roads have made their fifth annual report today. It gives a pleasing account of progress. The directors have no doubt that the five first divisions, reaching from Baltimore to the Potomac, a distance of upwards of 67 miles, will be so far completed as to be open for traveling during the present year. No material inconvenience is apprehended from having the principal business thorofares of Baltimore intersected by a railroad."

Dunn and Lee Head Simmons-Boardman Companies

New chairman of board and president have been associated with company for quarter century

THE election of Samuel O. Dunn as chairman of the board and of Henry Lee as president of the Simmons-Boardman Publishing Company, to succeed Col. E. A. Simmons, deceased, as announced in the *Railway Age* of October 10, places in executive charge of its management two men who have been associated with it for a quarter century. The association of Mr. Lee with the Simmons-Boardman Publishing Company and its predecessor organization dates from 1905, when only one paper was published; that of Mr. Dunn, from 1907. Each has participated to a major degree in the development of this company and its affiliates to their present position as publishers of nine leading business papers, including five in the railway field. At the same time Mr. Lee was elected chairman and Mr. Dunn president of the affiliated American Builder Publishing Corporation; Mr. Lee was also elected president of the House Furnishing Review Company.

Samuel O. Dunn



Henry Lee

The history of the Simmons-Boardman company during the past quarter century has been one of sound and steady progress. During most of this time Mr. Dunn was head of the editorial department and Mr. Lee of the business department. Both of the new Simmons-Boardman executives joined the organization prior to the beginning of its period of expansion. Both were connected with the old Railway Age, which on June 1, 1908, was consolidated by W. H. Boardman with the Railroad Gazette to form the Railroad Age Gazette (subsequently to become the Railway Age Gazette, and still later the *Railway Age*). In addition to the consolidated publication, the company also published the magazine now known as Railway Signaling. Expanding its activities to meet the need for additional papers in the railway field, the company acquired or established the publications now known as Railway Mechanical Engineer, Railway Engineering and Maintenance, and Railway Electrical Engineer. In 1920, through the acquisition of the Aldrich Publishing Company, Marine Engineering and Shipping Age and The Boiler Maker were added to the list of Simmons-Boardman publications. The Railway Review was purchased in 1926 and consolidated with *Railway Age*.

Marking the entrance of the Simmons-Boardman company into the building field, the American Builder was acquired in 1928. In 1929, the House Furnishing Review was purchased, and in 1930, Building Age was

acquired and consolidated with the American Builder, the consolidated paper becoming the American Builder and Building Age.

Samuel O. Dunn

Mr. Dunn was born on March 8, 1877, at Bloomfield, Iowa. When 12 years of age, he began to learn the printer's trade, and at 18 was editor and publisher of a newspaper at Quitman, Mo. After four years as associate editor of the Maryville (Mo.) Tribune, he joined the staff of the Kansas City Journal in 1900, and was promoted to editorial writer two years later. Beginning in 1904, he was for three years an editorial writer on the Chicago Tribune, during which time he began to specialize on transportation matters.

Mr. Dunn became an associate editor of the old Railway Age in January, 1907. A few months later he was made managing editor. On June 1, 1908, when the old Railway Age and the Railroad Gazette were consolidated to form the Railroad Age Gazette, he was appointed western editor. Mr. Dunn was appointed editorial director in 1910, and on October 1, 1911, succeeded W. H. Boardman as editor. At almost the same time, he completed the study of law to which he had devoted much of his spare time, and was admitted to the bar. Expansion of the company brought parallel expansion in his duties, as he became editor-in-chief of all papers acquired and established.

Mr. Dunn has been a frequent contributor to magazines and speaker on transportation subjects. He is the author of "The American Transportation Question," published in 1911; "Government Ownership of Railroads," published in 1913; and "Regulation of Railways," published in 1918, as well as numerous articles published in Scribner's, the Atlantic Monthly, the Review of Reviews, World's work, Nation's Business, etc. He has lectured on transportation subjects at Harvard University, the University of Illinois, Northwestern University, the University of Wisconsin, the University of Missouri, the University of California, the University of Indiana, Purdue University, the University of Texas, and Iowa State College, and has spoken on transportation problems before such organizations as the Investment Bankers Association, the Chamber of Commerce of the United States, the Railway Business Association, the National Metal Trades Association, the National Association of Manufacturers, the National Industrial Conference Board, the Rivers and Harbors Congress, and the Associated Traffic Clubs of America. He was a delegate of the American Railway Association to the International Railway Congresses at Rome in 1922, and at London in 1925. He is a member of both the Railroad Committee and the Inland Waterway Transportation Committee of the Chamber of Commerce of the United States, and is a former president of the Associated Business Papers, Inc.

In addition to his duties as chairman of the board of the Simmons-Boardman Publishing Company, Mr. Dunn will continue as editor of the *Railway Age*.

Henry Lee

Mr. Lee was born at Hamlet, Ill., on May 25, 1884, and received his education at the Aledo, Ill., high school and at the Metropolitan Business College at Chicago. He joined the old Railway Age at Chicago in 1905, and was assigned to the news staff in 1906. A year later he was appointed associate editor and transferred to New York. Upon the consolidation of the Railway Age and the Railroad Gazette in 1908, Mr. Lee was transferred back to Chicago, and a year later was placed in charge of the make-up department at New York. Later in 1909, Mr. Lee was placed in charge of the copy service department, shortly after which he was made a sales representative of the company. He was elected secretary in 1910 and was elected also treasurer in 1911. Mr. Lee was elected a director of the Simmons-Boardman Publishing Company in 1912, and became vice-president and treasurer in 1916, at which time he was placed in active charge of the business department. Mr. Lee relinquished his duties as treasurer in 1929, continuing as vice-president in charge of the business department.

Mr. Lee has been active in various organizations, including the Federation of Trade Press Associations (now the Associated Business Papers, Inc.), of which he was secretary-treasurer in 1910-11. He was successively secretary, vice-president and president of the New York Business Publishers Association during the years from 1916 to 1919, and was a director of the Technical Publicity Association in 1918. During the war he served as chairman of the Business Press division for the several government loans, and following the war served for two years as a member of the Surplus Property committee of the War Department. In 1929, he was elected vice-president, director and member of the executive committee of the Simmons-Boardman Publishing Corporation, and in the same year was elected vice-president and a director of the American Builder Publishing Corporation.

Some Ingenious Bridge Floor Details

INGENIOUS bridge floor details were developed by the bridge department of the Chicago & North Western in the design of street subway extensions for the house tracks of the new express terminal recently completed on its Galena division between Milwaukee avenue and Halsted street, Chicago. Owing to the fact that one of the streets crossed is on an ascending grade from the existing subway under the main tracks, the headroom available under the house tracks was appreciably less than under the main tracks, making it necessary to provide a bridge floor that had a thickness of only 24⅜-in. from base of rail to the lowest part of the superstructure. A further difficulty arose from the conditions imposed by the track layout. From north to south there are: A single track, an island platform, two house tracks spaced 13 ft. 6 in. center to center and the main platform of the building. With the platforms at car-floor level, there was ample depth for longitudinal girders along the edges of the platforms to support both the platforms and the tracks, and no problem was encountered in developing a transverse I-beam floor to carry the single track. But as there was not room enough to place a girder between the other two tracks and because it was found impracticable to get an effective transverse distribution of the track load on a deck beam floor spanning longitudinally between bents at the curb and street center lines, it was found necessary to span the floor for these two tracks transversely between the girders at the platform lines—a distance of 29 ft. 4 in.

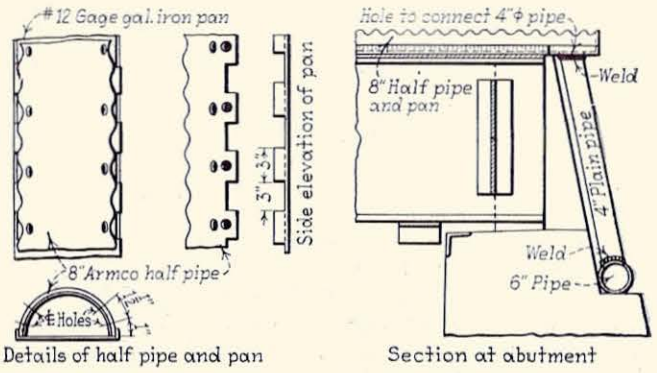
With the depth available it was necessary to limit the design to beams having a depth of not more than 18 in., but instead of having all beams span the full distance between the girders, it was found more economical to adopt a design consisting of beams spaced 2 ft.

center to center but with only every third beam spanning the entire distance between the girders. The long beams are 14-in. 365-lb. Carnegie beams (actual depth 17.71 in.) which, in addition to their connections to the girders, are connected to each other in planes 3 ft. 5 in. out from the girders by built-up beams made up of 14½ in. by 1½ in. web plates with top and bottom flanges consisting of one angle each. These short beams provide the support for the intermediate floor beams which thus have their span lengths reduced to 22 ft. 6. in. These are 16-in. 100-lb. Carnegie beams.

A ballasted floor was out of the question, but a waterproof deck was necessary and experience had indicated the need for a design that effectively separated the rail fastening from the waterproofing. It was also desired to center the rail loading over the webs of the wide flange beams.

The solution is an ingenious form of rail chair, I-shaped in both section and plan, 5½ in. in height and 24 in. long, these chairs being set end to end on the center line of each rail, which is held in place by Pencoyd type rail clamps. The chairs are bolted to the floor beams and to each other end to end. All of the floor, except the portion covered by the rail chairs, is covered by ⅜-in. steel plates, suitably notched plates being provided to fit around the rail chairs. The surface thus formed was covered with asphalt mastic to a thickness varying from ½-in. to 4-in. so as to provide a surface that would slope to drain outlets spaced 12 ft. center to center along the center of each track and between and outside the tracks. This surface was given a two-ply, saturated, cotton-fabric membrane waterproofing protected by one-inch asphalt planks, the waterproofing and planks being carried under the top flanges of the rail chairs, which have drip bosses along the edges.

Sheet metal troughs installed between the floor beams serve to receive the water from the drain outlets in the floor, but the serious problem was to carry the water from these toughs without encroaching on the under clearance. This was solved by the unusual expedient of boring 4½ in. holes through the web and vertical legs of the bottom flange angles of the supporting girders along one side of the floor so that pipes connected to the ends of the troughs could be carried through these girders and thus empty into a trough carried along the opposite side of the girders to downspouts at the supporting columns.

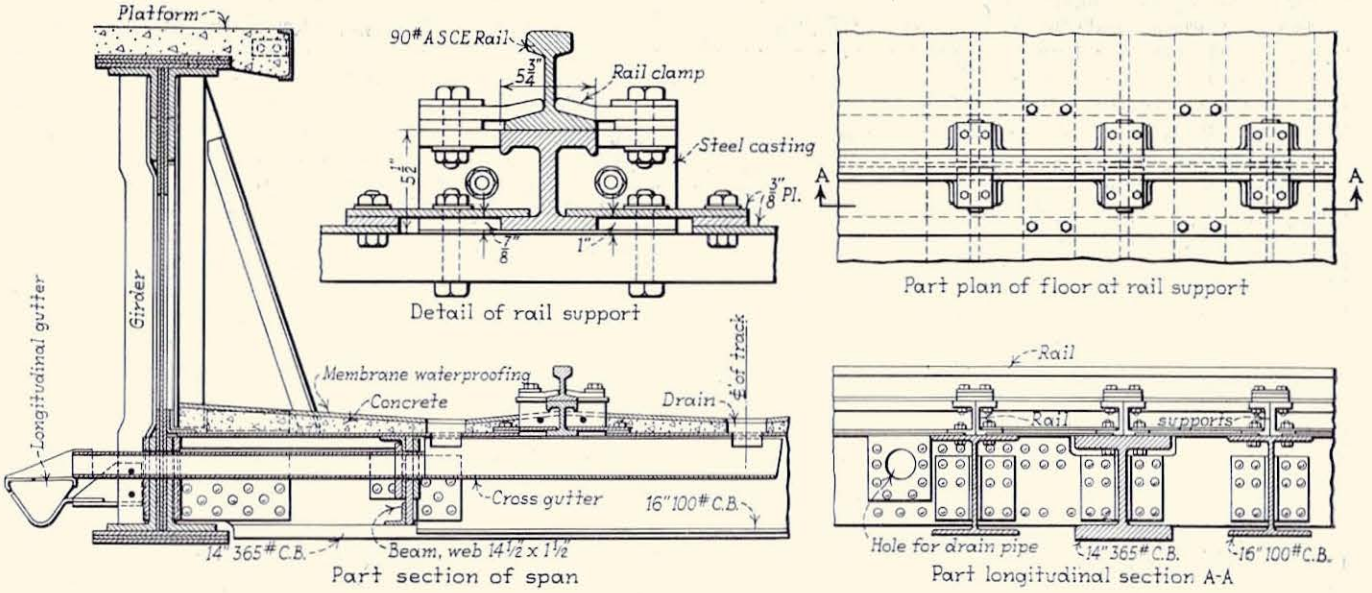


How the Half Pipe and Pan Were Used to Form a Bridge Floor Drain

Another interesting facility for drainage was employed on several of the other structures in this same project where the headroom was sufficient to provide a ballasted floor. These were also covered with a membrane waterproofing protected by one-inch asphalt plank, but along side the tracks and along the center line between tracks, the planks were omitted for a width that would allow room for the placing of a shallow ingot-iron pan that was made just wide enough to receive an eight-inch semi-circular corrugated Armco pipe. These pans were made of a flat piece of 12-gage metal, bent up on the sides to provide vertical flanges one inch high. These flanges were cut out to form notches three inches long at intervals of three inches, corresponding notches being cut in the edges of the half pipe. In addition, the pipe was perforated by two rows of holes between the notches.

These pipes and pans were extended about seven inches beyond the ends of the abutments where the pipes were sealed by welding plates against the ends. The ends of the pans had holes burned in them to receive a four-inch plain Armco pipe which was welded into place to serve as a downspout to carry water to a six-inch pipe carried across the back of the abutment on a shelf provided for it, the four-inch pipe being joined to the six-inch pipe by burning a hole and welding.

We are indebted for the information presented above to O. F. Dalstrom, engineer of bridges, Chicago & North Western, under whose direction this plan was developed and carried out.



Typical Details of the Minimum Thickness Floor Construction

Hearings on Railroad Practices

Pittsburgh sessions in connection with I. C. C. investigation of terminal services enter second week

PITTSBURGH hearings in connection with the Interstate Commerce Commission's investigation of railway practices affecting operating revenues and expenses (Ex parte 104, Part 2—terminal services of Class I railroads) entered their second week on October 12. The Baltimore & Ohio and the Pennsylvania were among some 15 carriers responding in that city. Initial sessions, which opened on October 5, were reported in the *Railway Age* of October 10; these included the presentations of the Monongahela, the Montour, the Pittsburgh & Lake Erie, the Pittsburgh & West Virginia and the Akron, Canton & Youngstown.

Pittsburg & Shawmut

R. E. Ball, general freight agent, offered brief testimony on behalf of the Pittsburg & Shawmut. This road originates 95 per cent of the business which it handles and 90 per cent of its tonnage is coal traffic. It has no connections with plant railroads or industrial common carriers; no yards on its lines are of any consequence, the witness said, and switching is all done by road crews. The Pittsburg & Shawmut publishes no switching rates; neither does it absorb switching charges of connecting lines at common points although it does participate in absorptions made at off-line points with respect to traffic handled under absorption tariffs of roads that join with the P. & S. in interline movements.

Baltimore & Ohio

The presentation of the Baltimore & Ohio commenced early in the session of October 7. C. R. Webber, general attorney, announced that evidence offered at Pittsburgh would cover the Eastern section while testimony with reference to other B. & O. lines would be deferred to later hearings.

E. F. Keene, terminal trainmaster at Philadelphia, Pa., was the first B. & O. witness. His testimony was restricted to the Philadelphia area where, Mr. Webber announced, there are no industries served by the B. & O. which receive allowances for performing their own spotting services. Mr. Keene in his direct testimony gave typical examples of switching moves involved in serving private sidings.

Initial cross-examination of this witness by I. C. C., Attorney A. G. Hagerty related to a comparison of the spotting service performed at private sidings with that involved in placing cars on public team tracks. Mr. Keene said that it is sometimes necessary to shift cars in order to make the required spot at a private siding but he had never had a request for placement of a car at a particular point on a team track. He, therefore, stated it to be his opinion that industrial spotting is to some extent more burdensome than team track switching.

Under subsequent cross-examination by J. S. Burchmore, representing the National Industrial Traffic League, Mr. Keene insisted that, save for cars of automobiles which are placed at the unloading platform and cars which must be spotted under a crane, there are no special spotting locations on team tracks. He agreed, however, with Mr. Burchmore's statement that team tracks must be policed and partially unloaded cars thereon resealed at night—services which the railroad does not perform at industrial sidings. Asked by W. W. Collin, Jr., representing the Monongahela connecting, where, if requested by the traffic department, he would draw the line if it were decided to impose spotting charges, Mr. Keene stated that he would make the amount of the service required, not the number or the capacity of the tracks served, the determining point in his decision. He further agreed with Mr. Collin that no Philadelphia concern served by its own private sidings requires more switching than is performed on cars handled in the produce yard of the B. & O. in that city.

Perishables at Philadelphia

G. S. Harlan, general freight agent at Philadelphia, followed Mr. Keene. In his opening statement with reference to tariffs covering B. & O. terminal services at Philadelphia, he said that there are no general switching absorption tariffs in effect there; there is, however, a restricted reciprocal switching arrangement between the B. & O. and the Reading. The witness later explained that this arrangement is based on the fact that the Reading has no tracks in South Philadelphia while the B. & O. has, and the set-up is reversed with respect to North Philadelphia. The Pennsylvania, with tracks all over the city, he added, publishes no switching charges in the terminal which are available for absorption.

Mr. Harlan was questioned at considerable length with reference to services afforded perishable freight handled through the Philadelphia produce terminal of the B. & O. Some of these commodities, he explained, are sold by the auction company operating there. Cars of commodities so disposed of are unloaded by the B. & O. without charge. The auction company, prior to the unloading, prepares a catalogue showing the locations of commodities offered for sale. With this catalogue in hand the B. & O. employees sort the commodities in the auction room in accordance with the locations shown.

Another unloading of perishables at Philadelphia, performed by the B. & O. without charge, Mr. Harlan said, is that which involves a transfer from cars into cold storage. There is at that point a cold storage warehouse owned by the Philadelphia Perishable Products Terminal Company, the stock of which is owned jointly by the B. & O. and the Reading. With the exception of space on the ground floor, reserved for the joint use of the owning railroads, the cold storage facilities are leased by the Philadelphia Perishable Products Terminal Company to the Quaker City Cold Storage Company, an independent concern. It is the practice of the B. & O. immediately upon their arrival to unload perishables consigned to cold storage in the Quaker City facilities, and to hold such perishables under cold storage in the warehouse space reserved to the B. & O. This unloading is without charge as is the storage until the free time on the cars would have expired under the demurrage tariffs.

The foregoing is done, Mr. Harlan explained, in lieu of holding the refrigerator cars under load until the expiration of the free time. When the free time has expired the freight in the B. & O. section of the warehouse is delivered to the Quaker City Cold Storage Company which operates commercial cold storage facilities. This plan, the witness said, relieves the B. & O. of icing the refrigerator cars and it releases the cars immediately, thus preventing congestion in the yard. In this connection W. P. Bartel, director of the I. C. C. bureau of service, who is presiding at the hearings, reminded the witness that there is no obligation on the part of the carrier to keep cars iced at destination without assessing additional icing charges.

At this point Mr. Burchmore objected on the ground that fruit and vegetable shippers had no notice that this matter was to become a subject of inquiry. Director Bartel's reply was that the order of investigation covers all terminal services affecting operating revenues and expenses. If, in lieu of icing at destination and charging for it, the Director continued, a carrier places commodities in cold storage for nothing, then that matter is a proper subject of the present inquiry.

O. S. Lewis, general freight traffic manager, was here called to explain the relations of the B. & O. with the Philadelphia Tidewater Terminal. This latter, he explained, is not a corporation but merely a name adopted for convenience. It is used to designate Philadelphia tidewater facilities operated by the Merchants Warehouse Company, a non-railroad concern. The Tidewater Terminal was leased by the Merchants Warehouse Company from the United States Government with the stipulation that all railroads would have equal rights to the facility. Thus, at the Philadelphia Tidewater Terminal, the Merchants Warehouse Company acts as agent for the B. & O., the Reading and the Pennsylvania. For its general services it receives 42 cents a ton for all freight handled over the facilities. An additional payment is also made by the railroads to cover stevedoring on import and export freight. This stevedoring charge happens at present also to be 42 cents a ton. This latter, Mr. Lewis stated, never takes the form of an allowance to a shipper.

Import China Clay at Philadelphia

G. F. Malone, superintendent of car service, presented testimony with reference to the storage in cars of import china clay at Philadelphia. He stated that during the year ending August 31, 1931, a total of 288 cars of import china clay was handled by the B. & O. at Philadelphia. Of this total, 201 cars were shipped out within the free time. Mr. Malone explained that under the tariffs covering storage of china clay in cars the free time is five days from the first 7 a. m. after the last car is loaded from the ship. Thus, he said, the first cars loaded from a particular ship's cargo might enjoy a free time of as much as seven days. After the expiration of the free time the rates for the storage in cars are one cent per 100 lb. for the first 10-day period and one-half cent per 100 lb. for each succeeding 10-day period. (These rates are the same as those in effect at Portland, Me., as quoted previously in connection with Maine Central testimony in the present case.)

Taking the 87 cars on which storage charges accrued and subtracting the free time and Sundays and holidays, Mr. Malone said that the revenue from storage averaged 55 cents a day per car. On these 87 cars per diem would have operated 4,211 days. Thus the per diem figure would have been $4,211 as against storage revenue of $2,330.15, the gross figure given by Mr. Malone. Director Bartel brought out in this connection that some of the china clay might for example be held in storage by the Pennsylvania in P. R. R. cars which subsequently moved over the B. & O. In such an event Mr. Malone agreed that the B. & O. would have to pay the Pennsylvania a per diem reclaim to cover the period during which the P. R. R. held the cars for billing. He added, however, that the B. & O. would collect the accrued storage on the cars involved. In other words, he further agreed, the B. & O. would in such a case, if it happened during the year ending August 31, 1931, collect an average storage revenue of 55 cents a day and pay a per diem reclaim of $1. Asked how long individual cars were held, Mr. Malone replied that one had been awaiting billing during the entire 12-month period covered by his check.

Following Mr. Malone there appeared in succession three B. & O. operating department witnesses—P. K. Partee, superintendent of the Baltimore, (Md.), Terminal division; W. W. Baldwin, assistant trainmaster at Washington, D. C., and J. J. Sell, general yardmaster at Cumberland, Md. Each presented testimony with reference to operations involved in switching and spotting service in the territories under their respective jurisdictions. S. House, freight traffic manager, followed with testimony on tariffs and rate relationships at the three terminals. No plants at any of these points receive allowances for performing their own spotting; there are, however, certain short-line charges which the B. & O. absorbs.

Baltimore Terminal of B. & O.

Mr. Partee first listed the several railroads, including short-line and industrial common carriers, which connect with the B. & O. at points within the Baltimore terminal area. The Municipal Harbor Belt, he explained in this connection, is a line owned by the City of Baltimore and operated by the B. & O. as joint agent for itself, the Pennsylvania and the Western Maryland. The B. & O., it developed, has at Baltimore a perishable produce terminal where commodities are unloaded and sorted for auctioning in a manner similar to that work at its Philadelphia terminal described above. At Baltimore, however, the cost of unloading and sorting is assumed by the auction company. The B. & O., which does this work at Philadelphia without additional charge over the line-haul rate, publishes a charge to cover the unloading of perishables at Baltimore. The auction company, Mr. Partee said, has evidently found it more economical to do the work itself than to pay the B. & O. for doing it.

After Mr. Baldwin had given typical switching moves involved in spotting cars in the Washington, D. C., area there developed an extended discussion among counsel as to the basis used by the B. & O. in classifying the several industries which it serves on private sidings. The distinction between the "ordinary private siding" and the "complicated system of plant tracks" was the issue. Mr. Burchmore insisted upon a specific definition of a "complicated system of plant tracks." Mr. House intervened to explain that the classification was left to the traffic man in the territory under survey; the headings, he said, were furnished by the I. C. C. and the B. & O. left the interpretation of the headings to the judgment of its several local traffic men. It is conceivable, Mr. House continued, that at some plants with several tracks simple placements might easily be made whereas other plants with less car capacity might be difficult to switch. (Most of the roads appearing prior to the B. & O. made an arbitrary division of these private sidings on the basis of the number of tracks in-

volved. Some considered two or more tracks a system, others drew the line at three tracks and still others at four or five.)

Mr. Burchmore persisted in his contention that the B. & O. exhibit embodying the classification of plant tracks be rejected or explained in detail but Director Bartel ruled that it might remain a part of the record with the understanding that it is not evidence of the difference between ordinary sidings and systems of plant tracks. Mr. Webber stated that it was not intended to be the latter—it was merely the B. & O.'s individual interpretation of the I. C. C. headings.

Mr. Sell testified as to Cumberland that no industries in this territory perform their own switching. Under cross examination by F. H. Wood, representing the Conemaugh & Black Lick, this witness conceded that the spotting time per car is less at the larger plants. Mr. Wood further brought out that some plants with several tracks involve simpler spotting operations than other industries with one long track on which designated spotting locations must be served.

Terminal Switching Absorptions

Mr. House explained that the B. & O. has no general switching absorption arrangements at Baltimore or Washington. At Baltimore it does, however, absorb the switching charges of the Patapsco & Back Rivers, and the Maryland & Pennsylvania and it makes a similar absorption with respect to one industry on the Canton. This latter, Mr. House told Attorney Hagerty, was dictated by competition with the Pennsylvania; the necessity for absorbing charges to other industries on the Canton has not arisen, the witness added. At Washington switching charges of the Chesapeake Beach to specified plants are absorbed by the B. & O. as are the charges of the Pennsylvania on Navy Yard traffic. At Cumberland the B. & O. has general reciprocal switching arrangements with the Cumberland & Pennsylvania and the Western Maryland.

Mr. Burchmore at this point declared that the National Industrial Traffic League would be very much opposed to a general cancellation of reciprocal switching tariffs and would want to have "much to say on the subject." He therefore contended that if cancellation is proposed the N. I. T. League would want fair notice that such an important matter had become an issue. Director Bartel again reminded Mr. Burchmore that the order of investigation covered all terminal services and thus reciprocal switching was a proper subject of the inquiry. For himself, the Director said, he would not personally recommend the cancellation of any reciprocal switching tariffs unless evidence of abuses appeared. Attorney Hagerty further assured Mr. Burchmore that there is no specific charge against reciprocal switching practices.

B. & O. Practices at Pittsburgh

W. F. Booth, superintendent of the Pittsburgh Terminal division, followed Mr. House. He first described typical switching moves in the Pittsburgh area and stated that because of the volume of traffic involved the spotting costs per car are less at the larger industries. Costs per switching locomotive hour, including interest, depreciation, and general repairs, range from $10.15 to $10.30 in the Pittsburgh district, Mr. Booth said; out-of-pocket costs alone total $6.97 per locomotive hour.

Calling to the attention of the witness the plants served by the B. & O. around Pittsburgh and receiving spotting allowances, Attorney Riley A. Gwynn of I. C. C. counsel asked if it would be physically possible for the B. & O. to perform spotting services at such plants. Mr. Booth replied that it would be impossible to do so with any locomotives which the B. & O. now has in the Pittsburgh territory. When Mr. Burchmore objected to Mr. Gwynn's examination of the witness, Director Bartel ruled that the evidence developing was "very pertinent." Mr. Collin then drew from the witness the fact that the allowances, with one exception, were made several years ago. Mr. Booth next agreed with Mr. Collin's statement that there have within the past 10 years been many changes in the size of standard switching locomotives and further that some of the smaller locomotives formerly used could have operated over the tracks of the plants receiving allowances. Mr. Booth was followed on the stand by H. H. Marsh, general freight agent at Wheeling, W. Va., who presented brief testimony with reference to B. & O. services at that point.

B. & O. Services at Youngstown

James J. Kane, terminal trainmaster at Youngstown, Ohio, was the witness who described the operating features of services provided by the B. & O. to iron and steel plants in that territory. Carriers serving this region in general perform all spotting services at steel plants under a pooled power arrangement. B. & O. locomotives do the work at a plant of the Republic Steel Corporation. In normal times it has eight crews and four locomotives per 24-hour day assigned to this plant; at present there are four crews and three locomotives.

The procedure followed in serving this plant, as described by Mr. Kane, involves the delivery of cuts of cars intact on an inbound track, designated for such delivery by the yardmaster in the employ of the plant. This delivery to the inbound track is made by locomotives other than those performing the spotting services within the plant. Actual placement at loading and unloading points is subsequently made, under the direction of the plant yardmaster, by the B. & O. locomotives assigned to the plant. Crews of these latter do no work other than that of spotting at the plant. At plants where locomotives of other lines perform the spotting the B. & O. simply delivers cuts of cars on the designated inbound track. There is little classification at the break-up yard involved in preparing these cuts for movement to the designated inbound tracks of the plant, Mr. Kane said.

In his testimony with reference to the spotting orders received by the B. & O. crews from plant yardmasters, Mr. Kane stated it to be his understanding that it is the duty of the B. & O. to effect placement at points designated by the consignee. Asked by Director Bartel where he got such understanding the witness replied it was based on his experience. When Mr. Burchmore came forth with the suggestion that the commission so held in the Car Spotting Case, the Director's retort to this prompting was that he was aware of what the commission said in that case.

The Republic Steel Corporation, it next developed, has its own locomotives which perform intra-plant switching; the B. & O. is, however, occasionally requested to do such work which is performed in accordance with published tariffs. Asked how, if the plant yardmaster directs its crews, the B. & O. knows whether or not intra-plant switching is done, Mr. Kane said that such moves would appear on the switching orders. These switching orders, he explained, are made out by the plant yardmaster for every move required of B. & O. crews and the foremen of the latter are required to sign such orders.

Director Bartel was interested in the process whereby cars reach the inbound track from which they are spotted by crews assigned to the plant. The witness affirmed the Director's understanding that the cars are first placed on the inbound track at the direction of plant employees; it was explained that the crews know which inbound tracks are assigned to specific commodities but it is the order of procedure to get rights in the plant. This latter, the witness said, minimizes interference with the locomotives at the plant; time is saved if knowledge is had beforehand that the way is clear. Mr. Burchmore in this connection preferred to say that the cars were "left" rather than "placed" on the designated inbound track, but Director Bartel said that he would continue to use the word "placed" because that is the way the tariffs read.

Mr. Kane told Attorney Hagerty that spotting costs per car, because of the volume of traffic involved, are less at the Republic plant than at smaller plants served by the B. & O. at Youngstown. The witness later told Attorney Gwynn that the foregoing statement was predicated on his general experience; he had made no special study and thus he did not know what the spotting time per car, expressed in engine hours, nor the cost per car was in connection with any of the different switching services under discussion.

C. H. Burgess, representing the Youngstown Chamber of Commerce, developed through Mr. Kane that there is much switching, in break-up or auxiliary yards, involved in lining-up cars for delivery on sidings of small plants; also, that while specific spotting moves are being made the train often stands on the main line and has to be protected. The witness then agreed with Mr. Burgess that such moves tend to increase costs per car of individual spur track spotting over such costs at the larger plants. Mr. Burgess also brought out the fact that at one point in the Youngstown district the Erie does switching for several railroads to private sidings of small plants under a pooled power arrangement. Here the line-haul carriers leave their cars on a specified track from which the spotting locomotive of the Erie delivers them to the several small plants.

Cleveland Terminal

A. H. Gensley, terminal trainmaster at Cleveland, Ohio, followed Mr. Kane. He first testified with reference to B. & O. interchange arrangements with short-line and industrial common carriers serving the Cleveland district and stated it to be his opinion that, because of the volume involved and the lack of classification required, this was a less costly switching service than that performed at industries. Team track deliveries, he thought, cost at least as much as spotting at industries.

Cross-examination of Mr. Gensley related in the main to services performed at a plant of the Grasselli Chemical Company where the B. & O. does the spotting on a system of about 25 tracks. The witness told Director Bartel that the general practice is to take cars twice a day from the break-up yard direct to this plant where they are spotted by the same locomotive which makes the yard-to-plant move. Occasionally, however, the witness explained to Mr. Burgess, tracks at the Grasselli plant are not open for spotting—for example, an empty car must first be pulled. In such instances, he said, the inbound cuts of cars are held on specified tracks. Mr. Burgess then compared this latter with cases where cars are held in B. & O. auxiliary yards while single-track sidings are being prepared for the required spotting.

When Mr. Hagerty designated the move from the hold track to the spotting point at the Grasselli plant as a "second service," Mr. Burchmore asked the witness if the same "second service" were not performed when it was necessary, for example, to pull a loaded car from a public team track and later replace it, in order to switch out an empty which was at a point on the team track beyond the loaded car. The witness would not, however, concede that the cases were exactly comparable since in the team track example cited the shifting of the loaded car was not a service performed for the consignee; it was a switch required to remove the empty, such removal being presumably for the carrier's convenience. In closing, Mr. Gensley explained to Director Bartel that the B. & O. has orders to bring all cars into the Grasselli plant; if there is no room at spotting points, the cut of cars is placed on a hold track without specific instructions from the consignee.

Traffic and Rate Testimony

B. & O. traffic and rate testimony with reference to Pittsburgh, Youngstown and Cleveland was presented by A. L. Doggett, general freight agent at Pittsburgh. He first identified exhibits setting forth payments made by the B. & O. to industrial common carriers and plants performing their own switching in these three terminal districts. At Pittsburgh, he said, there is not in effect what is generally known as reciprocal switching. Proportional switching charges are, however, published as between the B. & O. and P. & L. E. to certain specified sections of that district. These proportional switching rates vary from 28 to 76 cents a ton and their absorption is subject to a minimum line-haul revenue. Local switching rates at Pittsburgh for movement between points on the B. & O. and those on the Pennsylvania, Mr. Doggett said, are published as $1 per ton, minimum $25 per car; between points on the B. & O. and those on the P. & L. E., not involved in the specified territories enjoying the proportional rates referred to above, the local Pittsburgh switching charges are $1.13 to $1.26 per ton, minimum $25 per car. At Youngstown and Cleveland, the witness continued, general reciprocal switching arrangements are in effect, the rate being $2.70 per car at the former and $3.15 per car at the latter. Such charges of other carriers are absorbed by the B. & O. at Youngstown subject to a minimum line-haul revenue (excluding the amount absorbed) of $12.50 per car; the minimum revenue requirement for an absorption at Cleveland is $19 per car. Absorptions are made on both competitive and non-competitive traffic.

Mr. Doggett next explained the history of the pooled-power arrangements whereby spotting services for all carriers are performed at large steel plants by the locomotives of one road. This plan, he said, was "one of the economical arrangements which we inherited from federal control—perhaps the only one I know of." He added that the pooled power plan has proved so effective that it is being extended to other points, some of which he enumerated for Attorney Hagerty.

Director Bartel here questioned the witness at length with reference to industries receiving allowances and reached through an absorption of switching charges. The witness agreed that the switching tariff, absorbed, reads as one which contemplates spotting. He was reluctant, however, to agree with the Director that when a line-haul carrier absorbed a switching charge and made an allowance on the same traffic it was paying twice for spotting. Mr. Doggett considered such a set-up to be a matter between the railroads—an agreed division of revenue, although he conceded that technically the switching tariffs do contemplate the spotting for which the allowance is made to the industry by the line-haul carrier.

Mr. Burchmore questioned Mr. Doggett with reference to reciprocal switching arrangements and drew from the witness agreement that such arrangements are advantageous to the public as well as to the railroads. They create no preferences, Mr. Doggett said; they open up markets for shippers and they lessen the difficulties of the carriers with respect to fourth section requirements. It was the witness' opinion that the abolition of reciprocal switching would bring fourth section trouble and would thereby eliminate certain routes, now available to shippers. In this connection he explained that routes via junction points which would give the delivering carrier its line haul are often circuitous. Mr. Doggett told Attorney Hagerty that he was unable to say whether or not reciprocal switching rates taken individually were compensatory; he thought, however, that over a railroad system as a whole the matter evens out as between railroads entering such agreements. Reciprocal switching rates, Mr. Doggett further explained, are low and designedly were made low in order to permit absorptions.

Final examination of Mr. Doggett related to the question of whether or not the B. & O. could physically perform spotting services at plants now receiving allowances and if so whether or not the plant would permit B. & O. power to enter upon its tracks. The witness told Attorney Gwynn that he was unable to say whether it would be possible for large switching locomotives to enter these plants but added that the B. & O. has smaller locomotives which it could assign to the work. It was his assumption, he said, that the B. & O. would be permitted to do the spotting at these plants if it so elected.

Superintendent of Car Service Malone, who testified previously, was recalled as the final B. & O. witness at Pittsburgh. He was questioned by Director Bartel with reference to the operation of demurrage tariffs on cars which are standing on an interchange or hold track awaiting spotting at plants receiving allowances or where carrier power does the spotting. The line of examination was similar to that on demurrage pursued by the director with several previous witnesses—it related to the question of whether or not the carrier is assessing demurrage while the car is still in transit, under the line haul rates, to final destination. Mr. Malone's idea was that in the cases cited the carrier had placed the car but not its contents; demurrage tariffs he agreed with Mr. Burchmore, consider only the physical facts as to the car itself. Director Bartel then told attending counsel that he was raising this and other similar questions so that they would be discussed in briefs. "They are questions which disturb me," he added. At the close of Mr. Malone's testimony Mr. Webber announced that remaining evidence on behalf of the B. & O. would be presented at Cincinnati and Chicago.

Conemaugh & Black Lick

The foregoing testimony of the B. & O. was offered in two parts, its presentation being suspended following Mr. Marsh's testimony at the close of the October 8 session. It was resumed on October 12, and in the interim several smaller roads were heard. The Conemaugh & Black Lick was the first of these; its witness was Kenneth A. Kemmerer, vice-president. The Conemaugh & Black Lick, Mr. Kemmerer revealed, is controlled by the Bethlehem Steel Corporation, which has no plants on its line. The principal traffic of the C. & B. L.—65 to 70 per cent—is, he added, supplied by plants of the Bethlehem Steel Company and of the Bethlehem Mines Corporation. The Conemaugh does, however, have team track facilities which are used by approximately 20 shippers. This road publishes switching rates of 14 cents a ton on carload freight and two cents per 100 lb. on l.c.l.; these are absorbed by the connecting line-haul carriers and are the principal sources of Conemaugh revenue. Mr. Kemmerer told Director Bartel that the average revenue of the C. & B. L. is $5.50 per car on carload traffic; it requires minimum revenue of $1.58 per car on l.c.l.

The Conemaugh rate includes spotting of all commodities except iron ore, since line-haul rates on ex-lake iron ore, in accordance with a decision of the I. C. C., carry the car only to a convenient point of interchange with the plant. This road, however, has been spotting about one-half of the iron ore which it handles for an additional charge—an engine-hour rate. Switching costs, Mr. Kemmerer gave as $5.86 per locomotive hour, including only out-of-pocket costs.

Monongahela Connecting

F. A. Ogden, president and general freight agent, testified for the Monongahela Connecting. Mr. Ogden, it developed, is also general freight agent of the Jones & Laughlin Steel Corporation. This road publishes switching charges which are absorbed by its connections. It is the first road appearing thus far which makes allowances out of its switching revenue to iron and steel plants performing their own spotting. Switching tariffs of the trunk lines require the line-haul carrier to make the terminal allowances. Several plants to which the Monongahela Connecting formerly made allowances are now abandoned, but Mr. Ogden explained the history of the allowance paid to the Pennsylvania Works of the National Tube Company. This allowance, the witness said, was made at the request of the Pennsylvania and the Pittsburgh & Lake Erie, which roads desired to meet the competition of the B. & O. at the plant.

The B. & O., Mr. Ogden explained, has a direct connection with the plant involved, but if it were forced to spot cars, its locomotives would interfere with some of the B. & O. main tracks. Thus he thought the B. & O. rightfully hired the National Tube Company to perform the spotting. The only thing wrong with the allowance received by the National Tube from the Monongahela Connecting, Mr. Ogden told Director Bartel, is the fact that the Monongahela Connecting instead of the P. R. R. or P. & L. E. has to pay it. The traffic on which this allowance is granted amounted to only two cars last month.

Director Bartel further questioned Mr. Ogden to obtain the witness' conception of a second placement of a car. Mr. Ogden said that he would consider it a second spot, subject to additional charge, if cars had first to be placed adjacent to a plant and later switched to specific spotting points under the direction of plant employees.

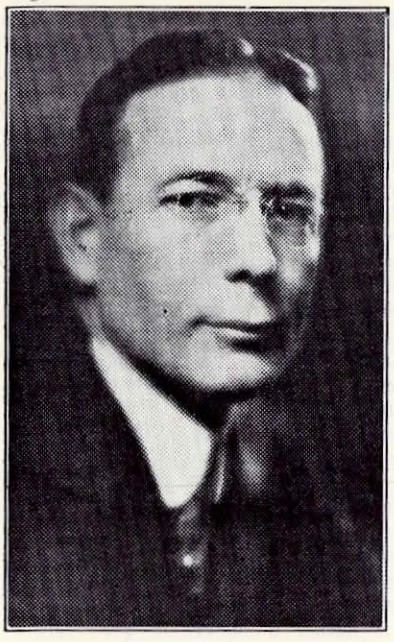
Western Maryland

The Western Maryland presented the testimony of its two division superintendents—A. Williamson and A. M. Smith—and of its freight traffic manager, E. L. McCaulley. Mr. Williamson explained typical switching services on the W. M. lines west of Cumberland, Md., while Mr. Smith's testimony related to the eastern section. This road makes no allowances to industries performing their own spotting although it does have certain switching absorption arrangements which Mr. McCaulley outlined. The W. M. publishes a charge of 2½ cents per 100 lb. for the loading and unloading of carload freight at Baltimore but itself assumes no loading or unloading costs on domestic freight except insofar as it provides crane facilities.

William H. Williams Dies

WILLIAM H. WILLIAMS, chairman of the board and president of the Wabash, died on Wednesday afternoon, October 14, of a heart attack at St. Louis, Mo. Chairman of the board of this company since 1915, it was but a month ago that he assumed the additional duties of its presidency, upon the retirement of J. E. Taussig. In the *Railway Age* of September 19 there appeared a sketch of his career.

Born June 25, 1874, at Athens, Ohio, Mr. Williams attended the Toledo, Ohio, public schools and the Beaver Valley Business College. He entered railway service as a cashier in the local freight station of the Pennsylvania Lines West at Toledo in May, 1890. The following year he became an assistant in the engineering corps of the Pittsburgh & Lake Erie, and in 1892 was employed as stenographer to the superintendent of telegraph on the Pennsylvania Lines West. A few months later he went into the office of Joseph Wood, who was then general manager of the Pennsylvania Lines West, working as stenographer for Mr. Wood until January, 1896. In that year L. F. Loree became general manager of the Lines West and Mr. Wood was elected third vice-president. Mr. Williams became Mr. Loree's secretary, and also chief clerk to Mr. Wood.



William H. Williams

When Mr. Loree became president of the Baltimore & Ohio, Mr. Williams was named assistant secretary of that company and acted also as assistant to the general manager. Mr. Loree went to the Rock Island in 1904, and Mr. Williams from April to October of that year was superintendent of freight transportation, yard and station service on the St. Louis & San Francisco, (now St. Louis-San Francisco), which was then under the same management as the Rock Island. For the two years 1905-1907 Mr. Williams was statistician for the General Managers' Association and also traffic manager of the Merchants' & Manufacturers' Association and the Chamber of Commerce of Pittsburgh. When Mr. Loree became president of the Delaware & Hudson in 1907, Mr. Williams joined him as his assistant, and a few months later was elected third vice-president. In 1915, he was promoted to vice-president of that road, from which position he resigned in 1928, to devote his entire time to the Wabash, with which road he had served in the capacity of chairman of the board and of the executive committee since 1915. Mr. Williams was also chairman of the board of the Missouri Pacific and several of its subsidiaries from 1924 to May, 1930, when he relinquished his Missouri Pacific connections.

An indefatigable worker with a practical knowledge not only of railway finance but of railway operation as well, Mr. Williams kept himself closely in touch with the detailed workings of every property with which he was connected; and his interest in and knowledge of their problems was a constant source of inspiration to his subordinates. Early in 1929 he interested himself in the formation of a fifth trunk line in eastern territory and gave to that task his usual intelligent zeal. Latterly, during the present trying times, he has devoted to the Wabash practically his undivided attention.

Administration Shows Interest in Railroad Situation

WASHINGTON, D. C.

PRESIDENT HOOVER and his advisers, including Secretaries Mellon and Lamont, have been giving consideration to various plans for improving the position of railroad bonds held by savings banks and other financial institutions, in connection with the more general plans for strengthening the banking situation generally. No authoritative announcement has been made regarding any of these plans and apparently it has been decided necessary to await the decision of the Interstate Commerce Commission in the rate advance case before reaching or at least announcing, any definite conclusions, since it is the shortage of railroad earnings that has particularly affected the bond situation. Various suggestions have been made for loan funds which would require Congressional legislation but analysis of the situation at once disclosed that loans to the railroads would hardly reach the fundamentals of the situation because only about $70,000,000 of railroad bonds mature in 1932 and the railroads need money to pay interest rather than new loans. It has been suggested that the National Credit Corporation organized by the banks at the President's suggestion might be used to make loans on bonds held by the banks, to prevent the consequences which would ensue if large quantities of these securities were to be thrown on the market, and it is thought that the general measures taken to increase confidence in the banks will eliminate some of the necessity that might otherwise have arisen for liquidating bonds held in the bank reserves. The President has also stated that if necessity requires he will recommend the creation of a finance corporation with available funds sufficient for any legitimate call in support of credit.

One suggestion has been advanced by which the local clearing house associations would appraise the valuation of railroad or industrial bonds and would issue certificates against them which would be rediscountable at the reserve institutions. The President also said that he would propose to Congress that the eligibility provisions of the Federal Reserve Act should be broadened in order to give greater liquidity to the assets of the banks and some suggestions have been made that railroad bonds be made eligible for rediscount.

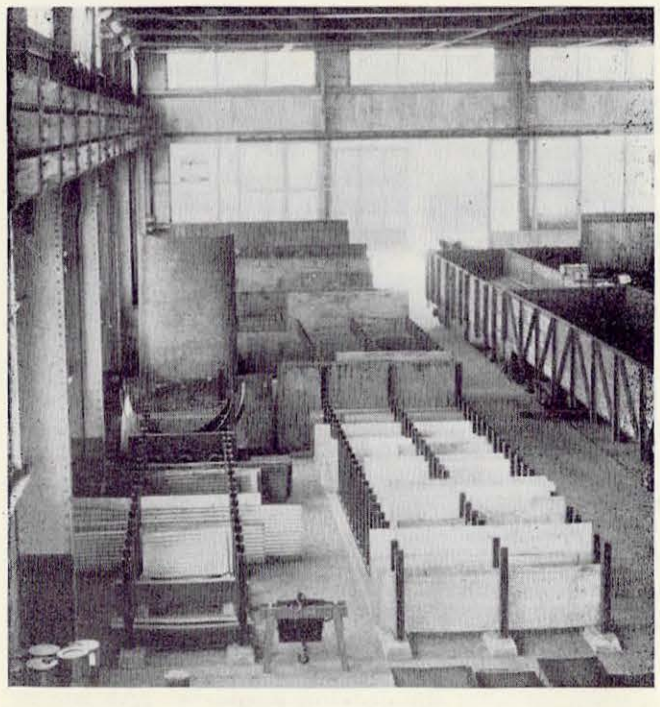
While Washington has been flooded with rumors as to the date and nature of the Interstate Commerce Commission's decision in the rate advance case, mostly emanating from outside Washington, there have been no indications from the commission's offices either as to when or what the decision would be. As late as Wednesday, after some papers had published reports

that the decision was at the Government Printing Office, the members of the commission were still in conference on the case and there was no indication as to whether there would be further conferences. An idea that the commission might be nearing a conclusion of its deliberations gained some credence on Wednesday when the commission postponed until the following day an oral argument before the full commission in the western hay rate case, for which three days had been assigned, and a hearing before Commissioner Aitchison at Detroit was postponed from October 15 to October 22. There have been almost continuous conferences ever since the conclusion of the arguments in Ex Parte No. 103 on September 30, some attended only by members of Division 7, the five commissioners who heard the testimony in the case, and others attended by the full commission.

Most of the rumors circulated about the decision have been pure guess-work, based on the general supposition that the commission would allow the roads about half of what they asked, or speculation based on the impressions gained by those who followed the hearings and arguments of the reactions shown by questions of the various commissioners from the bench. Many observers were inclined to believe that a majority of the commissioners might vote to deny the application of the railroads without prejudice to the filing of new proposals specifying particular commodities on which rates were to be increased. However, as such a plan would involve months of further delay while the railroads were trying to reach an agreement, after two weeks had gone by some of those who had held such a belief were inclined to think that the commission might be trying to make its own selections as to the rates to be increased or excepted.

THE NEW YORK CENTRAL, beginning November 7, will reduce the number of railroad tickets required for single occupancy of a Pullman compartment on any train to one and one-half. The present tariff requires two tickets.

* * *



Handling Sheet Metal and Boiler Material on the Santa Fe

Communications . . .

A Bus at 22 M. P. H. As Dangerous as Auto at 45

TO THE EDITOR:

In practically every state legislature railroad sympathizers have at one time or another made different attempts to curb bus competition. Most of these attempts have been in the form of proposals for increasing taxation, usually in the form of higher licenses and separate license measures to render more difficult for the bus line to engage in inter-state transportation. These increased taxation measures are unpopular, and as increased taxation would, it is argued, result in higher transportation costs to the public, they are difficult to pass and are often defeated. Unfortunately it seems to be part of the tradition of American lawmaking bodies to heap burdens on to the railroads, and the bus and truck groups have won their way, almost without exception, using the same old play of protecting the public against the "monied railroad interests," whenever the railroad adherents have advocated these legislative brakes against the bus lines.

There is another form of legislation, far easier to secure, which would be equally as effective as high taxes, and if applied would return to the railroad a large percentage of their former passenger and freight traffic. These are safety measures. They are less difficult to enact than taxation measures. Speed laws on public highways are created as a part of these safety measures. These speed laws are designed to prevent or minimize accidents. An accident involves primarily an impact. It then follows that the formula of the "moment of impact equalling the mass, times the velocity squared" should be applied to equalize the factor of safety for which speed laws are primarily created. If this formula were applied to buses, and various classifications created grouping trucks and other vehicles to regulate their speed in proportion to their weight, the net result would be a law very favorable to our railroads.

This form of legislation is necessary, and it would meet popular approval. There is hardly a farmer in the country who hasn't sworn at road hogs when a bus traveling at fifty or sixty miles an hour rolls past him with a deafening blast of its horn.

As an example of the excessive speeds at which these buses are now being operated, one has but to consult their printed time tables. A bus line running between Washington and Baltimore advertises its trip in one and one-half hours, and includes fourteen flag stops. It would be difficult to estimate the number of "grade crossings" along the line of this trip, certainly well into the hundreds. The Pennsylvania Railroad local with a clear right-of-way, and approximately the same number of flag stops, takes the same time for this trip. Another bus line advertises the trip from New York to New Haven in two and one-half hours. This is shorter than the time made by the New York, New Haven & Hartford locals, and the N. Y., N. H. & H. advertises about half the number of stops. Small wonder they detract from a railroad's passenger traffic; these speeds are unfair to public safety and every motorist lives in terror of these juggernauts of the highways.

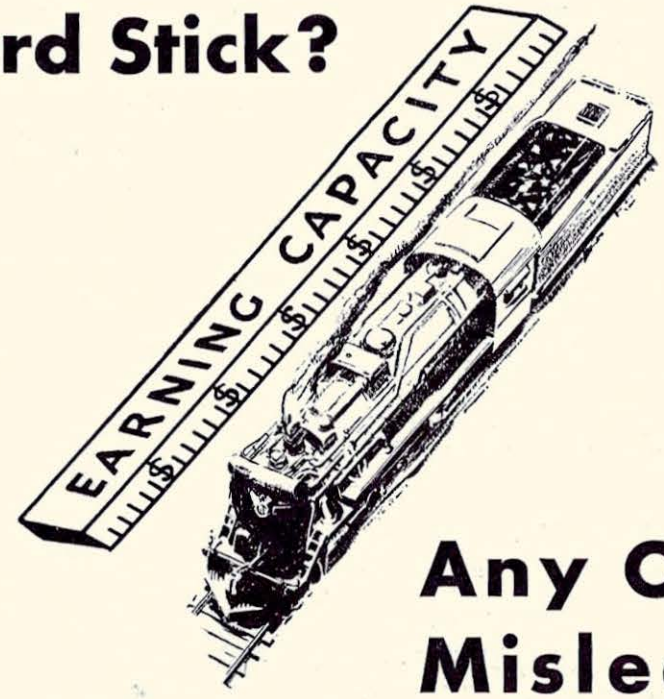
Apparently little action is at the present time being taken by local police officers to curb these bus speeds. On the back front cover of the July issue of "Bus Transportation," is the advertisement of a bus engine manufacturer, which states that its engines are in use in forty and fifty passenger buses, capable of an operating speed of over seventy miles an hour. If a state having a maximum speed limit on its main highway of forty-five miles an hour, would apply the "mass times velocity squared" formula to this bus, using the average passenger car weight as its standard for obtaining the basic factor of impact, it would then issue a license to this bus, prohibiting a speed which in this instance would work down to about twenty-two miles per hour. If this speed limit was enforced, passenger traffic would soon come back to the railroads. Highways would be safer, and on the same formula a great deal of the freight traffic carried by trucks would come back to its former carriers.

W. H. LABROT,
Vice-President, American Creosote Works, Inc.

Odds and Ends Department Appears on Next Left Hand Page

DO YOU

Measure Your Motive Power With This Yard Stick?



Any Other is Misleading!

"The best locomotives installed within recent years are so much better than those previously in service that economies could be effected by retiring many of the latter."

RAILWAY AGE EDITORIAL

LIMA LOCOMOTIVE WORKS INCORPORATED

LIMA LOCOMOTIVE WORKS • Incorporated • LIMA, OHIO

Odds and Ends . . .

Speed King Is Agent's Son

Lowell R. Bayles, who electrified the crowd at the recent national air races in Cleveland, when he averaged 236 miles an hour in the 100-mile Thompson Trophy race, winning first prize, is the son of R. E. Bayles, agent for the Illinois Central at Newton, Ill.

A Rattling Good Piece of Business

The Southern recently delivered to a consignee at Winslow, Ind., an express shipment of 18 diamond-back rattlesnakes which had originated in Texas. The shipment was called for promptly by the carnival company to which the snakes were consigned, to the considerable relief of the station forces.

An Italian Employees' Magazine

Magazines published by railways for the information and enjoyment of their employees are quite common, but the Delaware & Hudson, so far as we know, is the only one to print such a magazine in a foreign language. As a supplement to its employees' "Bulletin," the Delaware & Hudson issues a two page "Bollettino" in Italian for the benefit of those employees who are familiar only with this language.

Collects Fishing Tackle

J. A. McDougal, superintendent on the Rock Island at Little Rock, Ark., has very little time to devote to his favorite hobby, fishing. Nevertheless, he is said to have the most elaborate and complete collection of fishing tackle to be found anywhere on the railroad. Mr. McDougal's fishing tackle represents the collection of practically a lifetime, and nearly every item in it was given to him by his friends and fellow employees.

May Abandon Old Line

It is likely that one of the first railroad lines built in the United States—a 20 mile branch from the old port of St. Marks, Fla., to Tallahassee—may be abandoned. Application for the abandonment of a part of this branch line was filed several weeks ago by the Seaboard Air Line. The line from St. Marks, on the Gulf of Mexico, to Tallahassee is the oldest railroad in Florida, and for many years was the only railroad in that state. It was chartered in 1834 and was in operation in 1836. In those days, St. Marks was one of the principal seaports of Florida. Thousands of bales of cotton were hauled from southern Georgia, southeastern Alabama and northwestern Florida to St. Marks, where they were loaded on sailing vessels for transport to foreign markets.

Civics a la Carte

Dining car patrons on the Lackawanna recently discovered, on the back page of the menu, a list of the 48 states, the names of their respective governors, their capitals, their nicknames, and their state flowers. To say that passengers read the list with interest is to put it mildly. A surprising number of them did not put the menu cards back in the rack but took them along with them.

Back of this, of course, there is a story, and here it is. Recently President J. M. Davis of the Lackawanna and a number of his fellow executives were sitting around a camp fire talking about one thing and another. Suddenly one of the members of the group asked, "Who can name the capitals of all the states?" Surprisingly—or perhaps inevitably—no one present could do so. The incident stuck in Mr. Davis' mind. He asked himself, how much does the average man know about state capitals when none of those in this party can remember all of them? Mr. Davis decided that a list of states, their capitals, nicknames, state flowers and their governors would make refreshing reading. An order went out, the menus were printed, and the Lackawanna succeeded in giving its patrons something to think about besides the depression.

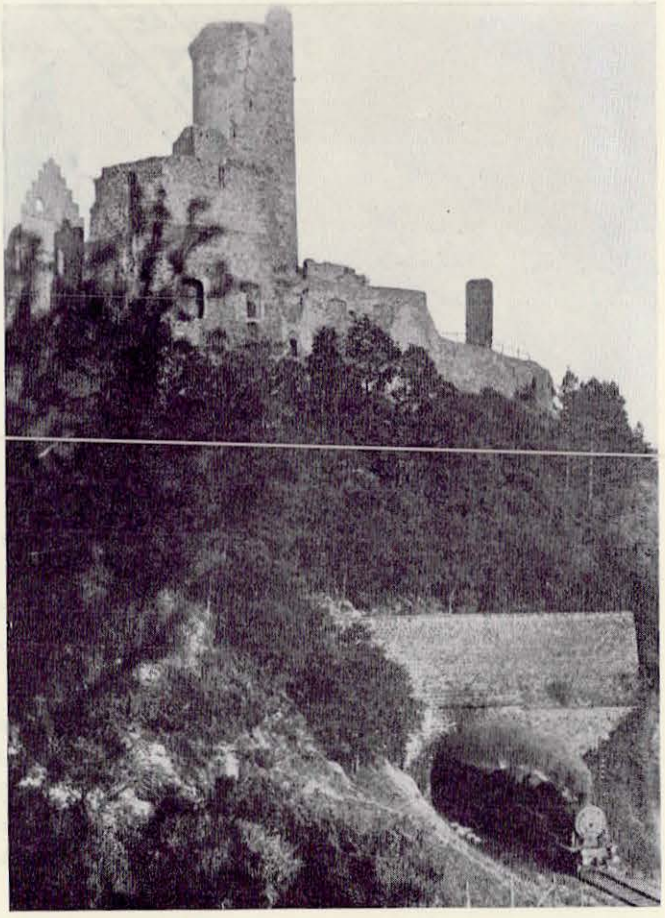
Another Railroad Problem

Probably it is an old one, but we have just run across one of those trick problems which are so popular in so-called intelligence tests. This one, in spite of its English flavor, is supposed to have been used in an American civil service examination. See if you can figure it out.

"There are three men in a train crew, Smith, Robinson and Jones. They are guard, engineman, and fireman. There are three passengers, Mr. S., Mr. R., and Mr. J. Mr. R. lives in Leeds. The guard lives halfway between Leeds and Sheffield. Mr. J. earns $480.50 per month. The guard's nearest neighbor (one of the three passengers) earns exactly three times as much as the guard. The guard's namesake lives in Sheffield. Smith beats fireman at billiards. Who is the engineman?"

"Air Rights" Reversed

They do things differently in Germany. In this country a not uncommon procedure, particularly in congested localities, is to lay railroad tracks and later, by utilizing the air rights, to construct buildings over them. In the Eifel Mountains of Germany, however, the procedure, in at least one instance, was reversed. Here the railway line traverses a tunnel leading under a castle which was built more than 700 years ago and which has been a ruin since 1689.



Courtesy, German Tourist Information Office, New York
Where Trains Dive Under a Castle

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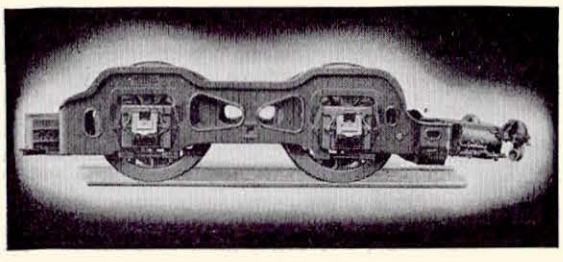
19 SOUTHERN PACIFIC *FAST PASSENGER TRAINS RELY UPON* BOOSTER EQUIPPED LOCOMOTIVES

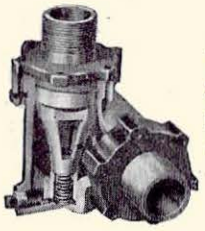


AMONG them you find such famous trains as the "Overland Limited", the "Golden State", the "Cascade", the "Shasta" and the "Sunset Limited". On some trains, Booster equipped locomotives lend a helping hand only where grades are steep. On others, the full advantages of the Booster are used from one end of the road to the other.

The extra power of the Booster takes the jerk out of starting and adds to traveling comforts. It is an aid in handling heavy trains in mountain territory. Starting is easier--acceleration to road speeds is faster--higher speed is maintained on grades.

The Booster permits the design of locomotives to suit more exactly the work to be done. Savings in capital result--needless operating and maintenance expenses are avoided.

FRANKLIN
RAILWAY SUPPLY CO., INC.
NEW YORK CHICAGO ST. LOUIS SAN FRANCISCO MONTREAL



THE FRANKLIN SLEEVE JOINT
Permits application above the drawbar.

NEWS

Congress Asked to Revise Railroad Law

Joint committee of railroads and shippers suggests changes in Transportation act

A request that revisions of the Transportation act and other regulatory legislation be undertaken at the coming session of Congress has been transmitted to the chairmen and ranking minority members of the congressional committees dealing with interstate commerce by R. C. Fulbright, chairman of the legislative committee of the National Industrial Traffic League, in a letter saying that while the subject has been before Congress for consideration from time to time for several years "not until now has it seemed imperative that some action should be taken." The revisions suggested include repeal of the recapture provisions of the law and the adoption of "a flexible rate-making rule" in place of Section 15a.

Mr. Fulbright refers to conferences which have been held between committees representing the railroads and the league, the results of which will be reported to the American Railway Association and to the traffic league at a meeting which opens in Chicago on November 18. He also says that recommendations for new legislation will be presented at the beginning of the coming Congress. Meanwhile, however, he undertakes to give an outline of the views of shippers as to various problems involving transportation, including a statement of "Lessons From the 15 Per Cent Rate Case," which he says has served to demonstrate the necessity of taking some action with respect to Section 15a.

Mr. Fulbright points out that the league has given consideration to Section 15a at every annual meeting since 1921, and that it is the conviction of that organization that the recapture clause should be repealed *ab initio* and a flexible rate-making rule adopted in lieu of the present provisions. "The shippers believe," he says, "that the adoption of a more reasonable rate-making rule will ultimately inure to the benefit of the railroads. The existence of an uneconomic, unworkable rule is never going to be satisfactory to either side of the controversy. Furthermore, the shippers believe that the recapture provisions have resulted in building up enormous liabilities on the part of the principal railroads of this country which hang like a pall over them during

(*Continued on page 613*)

The great highways that run from one end of California to the other are becoming dangerous on account of the trucks. A great proportion of the serious accidents occur when passenger cars try to pass these mud turtles.

The business men of Santa Barbara are urging the construction of separate highways for freight. Either this will have to be done or else a third traffic lane set apart for slow-moving vehicles on the present highways. In either event the trucks should go much further toward paying road expenses than at present.

—Harry Carr in the Los Angeles (Cal.) Times.

Five Roads File Truck Body Rates

Eastern lines propose new flat rates to aid in meeting highway competition

Tariffs proposing to establish flat rates for the transportation of truck bodies, loaded or empty, to be furnished by shippers and equipped with hooks by which they may be lifted between freight cars and trucks or trailers by cranes, have been filed with the Interstate Commerce Commission by the Baltimore & Ohio, the Central of New Jersey, the Delaware, Lackawanna & Western, the Pennsylvania, and the Richmond, Fredericksburg & Potomac, to become effective on or about November 5 for an experimental period of one year. Flat rates are proposed for three sizes of truck body, 15 ft. long by 8 ft. 6 in. wide and 9 ft. high; 15 to 20 ft. long, and 20 to 25 ft. long, with the same width and height dimensions; and the rates apply regardless of the contents, except that the tariffs include lists of commodities that will not be accepted for such transportation, such as perishables, explosives and especially fragile articles. The tariffs, which bear on their face statements that the rates are proposed to meet motor truck competition, have been under scrutiny by the commission's suspension board.

The Baltimore & Ohio tariff proposes rates on the three sizes of truck bodies, respectively, as follows: Between Jersey

(*Continued on page 613*)

Why Wait Any More For Santa Claus?

Railroad employees, through their political power, could end subsidy to competitors

The Norfolk & Western had its twelfth annual system efficiency meeting at Roanoke, Va., on October 9, the program being carried to employees throughout the system through an elaborate radio-telephone hook-up. Addresses were delivered by officers of the company and by Samuel O. Dunn, editor of the *Railway Age*. Details of the broadcast hook-up were published in the issue of October 3, page 532.

"It is high time that the American people should stop reading the stock market ticker and looking for Santa Claus," said Mr. Dunn. "They should force large reductions in taxes and in the expenditures of all their governments, and settle down to solving their own particular business problems. When they begin doing these things prosperity will soon return.

"Never in the recorded history of our railroads have their net earnings been so small in proportion to their investment as they are now. Only past conservatism in their financing over a long period of years has saved them thus far this year from almost universal bankruptcy. Never was there so much unemployment among railroad men. The number of employees declined from 1,736,000 in June, 1929, to 1,317,400 in June, 1931, or by almost 419,000, and many of those still employed are working only part time.

"No matter how much traffic other carriers may take, the railways must continue to render the bulk of our transportation service. If we maintain them in good condition and improve them, they will render good service such as they have rendered within recent years. If we let them deteriorate instead of maintaining and improving them, they will render poor service. They are rapidly deteriorating now. The expenditures upon their maintenance will be about $600,000,000 less this year than in 1929.

"The diversion of long haul traffic from the railways to carriers by water and highway is principally due to government policies which are unfair to the railways and their employees, and economically unsound from the standpoint of the public. In order to secure for the railways the traffic to which they are entitled on sound economic principles,

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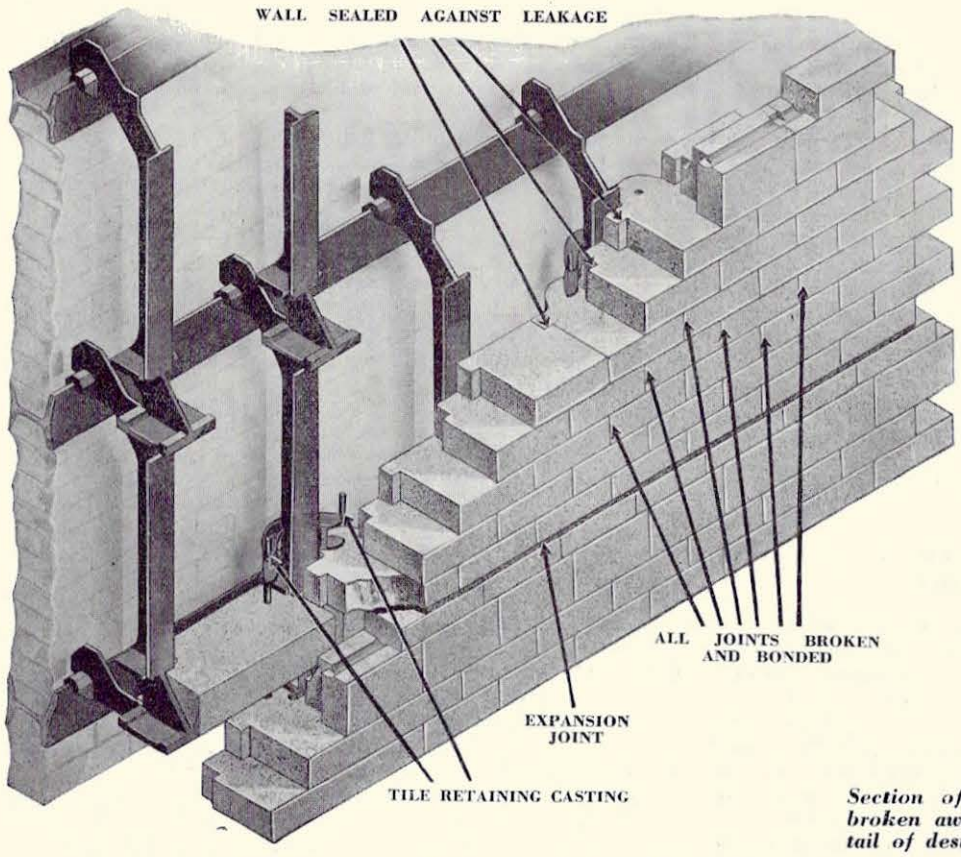
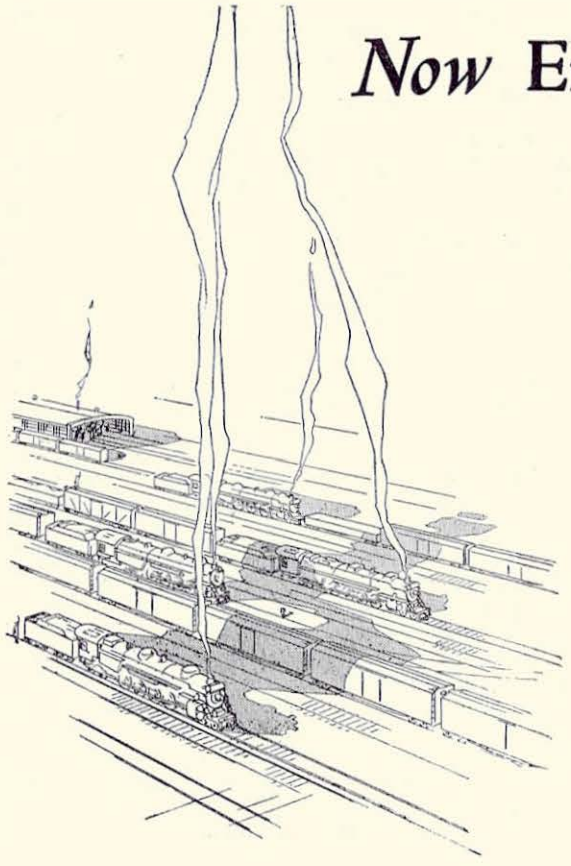


Section of wall partly broken away shows detail of design

American sectionally supported air-cooled wall

AMERICAN ARCH COMPANY Activities

Now Embrace *all* Industry



WHEN a great steel company built the world's largest heating furnace, it came to American Arch Company for the roof.

When new oil stills were under consideration, a leading oil company chose American Arch Company to supply suspended Arches and air cooled side-walls.

When modern boiler plants are built in any industry, American Arch Company is called upon for design of air cooled side walls and Arches.

On the railroads, new locomotives for many years have had their Arches designed by American Arch Company. This engineering service is one of the important elements in satisfactory Arch Brick service. American Arch Company has the necessary background of experience to supply it.

AMERICAN ARCH COMPANY

Incorporated, NEW YORK CHICAGO

these policies must be so changed that all subsidies will be withdrawn from competing means of transportation and that comparable regulation will be applied to all carriers.

"Political influences are largely responsible for the differences in the ways in which railways and other carriers are now treated, and political influences must be used to correct the situation. Railway employees have a vast political influence, and they should use it to secure fair treatment for the railways. When railway employees throughout the country begin voting for men who favor fair treatment of the railways and their employees and against men who favor such unfair treatment of the railways and their employees as now prevails, there will soon be a radical change in our present government transportation policies."

Favors Federal Body to Study Rail Problems

A federal commission to assemble the basic facts of the railroads' troubles and to recommend suitable remedies, was advocated by Harry R. Gifford, chairman of the committee on federal legislation of the National Association of Mutual Savings Banks, at its annual session in New York last week. Mr. Gifford said such a commission should be composed of representatives of the railroad executives, the unions, investment bankers, insurance companies, mutual savings banks, the Interstate Commerce Commission, and should have a chairman representing no interest except that of the general public.

He also expressed the opinion that large economies could be realized by joint use of terminals and by the elimination of wasteful competition in both freight and passenger service.

Damages Asked for Failure to Receive Relief Rates

Henry C. Stuart, of Elk Garden, Va., formerly governor of Virginia, has filed with the Interstate Commerce Commission a complaint against the railroads asking for reparation of $10,000 for damages alleged to have been suffered by him because of the failure of the railroads to accord him the emergency reduced rates on shipments of livestock during the drought period in 1930. The complaint says that up to September 15 he was unable to take advantage of the emergency rates because of the failure to appoint an agent empowered to approve applications for permits for shipments at the reduced rates in Russell county, Va., and that after he had made some shipments at the reduced rates he was refused further permits "on the alleged grounds that he was not a needy farmer, but a millionaire and a former governor of Virginia."

N. & W. Opens Two New Coal Bureaus

Two new coal bureaus, established to render aid to coal producers in the territory served by the Norfolk & Western and to distributors and consumers of coal, have been opened by the railway in Cleveland, Ohio, and Winston-Salem, N. C. The success of two similar bureaus, established in Chicago and Detroit during 1929, led to the establishment of the new bureaus.

J. B. Giltner, formerly assistant manager of the coal department of the Norfolk & Western at Roanoke, Va., has been appointed district manager of the Cleveland coal bureau. The Winston-Salem Bureau will have as its district manager, R. B. Williamson, who held the position as assistant general superintendent of the Raleigh-Wyoming Coal Company at Beckley, W. Va., before coming with the railroad.

The duties of the district managers are to form contacts with coal receivers and consumers in the cities in which they are located and in the surrounding districts, rendering aid in the expeditious movement of coal to their respective territories. They will also lend their aid to, and co-operate with, coal operators located on the railway, and to sales agencies in securing new coal business.

New Study of Pan-American Railway Plan Proposed

The fourth Pan-American Commercial Conference, held in Washington from October 5 to 13, adopted a resolution concerning the status of the Pan-American Railway in the light of changes which have occurred in recent years and the services rendered by various means of transportation. In view of these changes the conference recommends that the committee of the International Conference of American States re-study the whole question of the Pan-American Railway with a view to proposing such modifications of the plans for the railway and eventually its co-ordination with other means of transportation, as may be best suited to the promotion of the original purposes of the railway, i.e., the development of commerce, facilitation of international travel and the promotion of international good will. In the meantime the conference recommends that in the case of any small gaps that remain in an otherwise continuous line of the Pan-American Railway, the country or countries concerned should give careful consideration to the desirability of proceeding with the completion of such sections.

May Lighten N. Y. Savings Bank Bond Law

The New York State Legislature will be asked immediately after it convenes at Albany on January 1 to vote measures making the present laws concerning bonds held by trustees less stringent, Senator Nelson W Cheney, chairman of the joint legislative banking committee, has announced. The changes will chiefly concern railroad bonds, he intimated. The committee will meet soon for the purpose of receiving testimony of bankers and officers of institutions holding large amounts of legal investments. Definite proposals will be formed following the hearings.

As the law now stands a trustee having railroad bonds which were removed from the state list of securities legal for savings bank investments is faced with another year in which they will not qualify. In such a case he might be held personally liable.

The amendment will be in the nature of a moratorium, it is understood. The basic law will not be disturbed. The requirement is that an issue to qualify must have net earnings sufficient to cover fixed charges 1½ times for five out of six years, one year of which must be that immediately preceding investment by the institution.

Motor Club Opposes Truck Traffic

Declaring that "Moving of the railroads onto the highways must be blocked, and nothing left undone toward returning the hauling of freight to its rightful place, the railroads," members of the Blair County (Pa.) Motor Club, meeting in Altoona on October 5, went on record as being strongly opposed to the traffic of heavy trucks over the highways of Pennsylvania.

Discussion of highway truck traffic was the principal subject of the meeting, and resulted in plans for an investigation of conditions, while a committee of five was appointed to compile statistics, which will be embodied in data to be sent to other motorists' organizations in Pennsylvania and in other states, asking their co-operation in the movement to curb the truck nuisance. The club's campaign will be waged primarily in the interests of safety, members contending that the operation of trucks on highways reduces the safety margin for all other traffic; but it was also pointed out that Pennsylvania highways are not built to stand heavy truck traffic and are showing tremendous damage as a result of their use by heavy trucks, often greatly overloaded.

New York Central to Run Special Train to R. B. A. Dinner

To accommodate members of the Railway Business Association who live in and around New York City, the New York Central will operate a special section of the Advance 20th Century Limited from New York to Chicago on November 3. It will arrive the following morning and the association's annual dinner will be held that evening.

The New York group will return on another special section of the Advance Century at noon, November 5, arriving in New York the following morning.

The train will be operated each way on the Century's regular schedule of 20 hours.

I. C. C. Investigating Fuel Practices

Hearings in connection with the Interstate Commerce Commission's investigation of practices of railroads affecting revenues and expenses will be held at Norfolk, Va., on October 28 and at Atlanta, Ga., on November 4, for the particular purposes of eliciting detailed information regarding methods used by the railroads in the selection of fuel, the allocation of fuel orders, the bases on which prices paid for fuel are fixed, the fuel inspection service and the distribution of and accounting for fuel. The hearings will be held before Examiner

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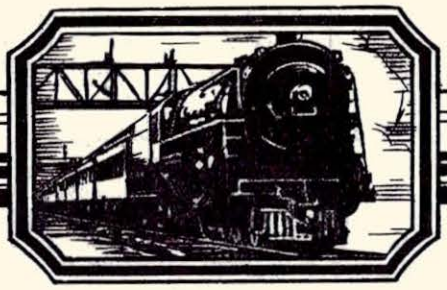

TO ECONOMIZE— MODERNIZE

According to the Annual Statistical number of the Railway Age, the railroads of this country ordered 734 new locomotives in 1927. In 1928 and 1929 new orders amounted to 603 and 1212 respectively. In 1930 they dropped to 440 and in 1931 new orders are practically nil.

In other words, the average new locomotive orders per year for the last five years will approximate 600.

Knowing that there are practically 58,000 locomotives on the main lines of this country; knowing that 80 per cent of them are now over ten years old, and also that 45 per cent are over twenty years old; and using the replacement rate of 600 per year, the average for the past five years; how old will some of the engines running today have to be before they are all replaced?

And how efficient will they be in view of the fact that the modern engine of today is admittedly efficient enough to make many engines from five to ten years old practically obsolete?

American Locomotive Company
30 Church Street New York N.Y.

Charles W. Berry and the railroads whose offices are located conveniently to those cities are requested to have present officers who from practical experience are able to furnish the desired information. The principal basis or source from which this phase of the inquiry will proceed will be the responses made to the questionnaire addressed to the roads on August 5; but respondents are also requested to have present at the hearings tabulations of the bids tendered for fuel during the years 1929, 1930 and 1931, and to be prepared to testify regarding the coal mines on their lines; the prices paid them for fuel, and other collateral information.

Pittsburgh Railway Club

The Railway Club of Pittsburgh (Pa.) will hold its next meeting at the Fort Pitt Hotel on Thursday evening, October 22. This will be the annual meeting, with election of officers and musical and vaudeville entertainment.

Revision of Ratings on Fruits and Vegetables Suspended

The Interstate Commerce Commission has suspended from October 15 to May 15, 1932, proposals to revise, in such a way as to increase the rates, the ratings on certain fruits and vegetables in Western Classification Territory.

Fire Protection Association to Hold Sectional Meetings

The annual meeting of the Railway Fire Protection Association having been postponed this year, one-day sectional meetings are to be held in October and November. The Eastern Section will hold its meeting on October 20, at the Bureau of Explosives' office, 30 Vesey street, New York.

New Industries on Katy

A total of 119 new industries located along the Missouri-Kansas-Texas during the first nine months of 1931. New industries and extensions of present industries, which involve investments of $5,386,200 and $175,850, respectively, will provide employment for 2,251 persons and produce an estimated tonnage of 34,568 cars annually.

Grape Shipments Below 1930

Grape shipments from California during the present season, to October 7, totaled 22,903 cars, as compared with 30,520 last year. According to the Car Service Division of the American Railway Association, the total shipments this year will be between 35,000 and 40,000 cars, as compared with 65,140 cars actually moved during the 1930 season.

Pennsylvania Contracts for More Electric Power

A 20-year contract to supply all electric power required by the Pennsylvania for use from the Susquehanna river to Havre de Grace, Md., has been given to the Consolidated Gas, Electric Light & Power Company, Baltimore. The supply of power will start early in 1933 and will be furnished also by two affiliates, the Pennsylvania Water & Power Company and the Safe Harbor Water Power Corporation.

Number of Railway Employees Again Reduced

The number of railway employees as of the middle of the month of August was 1,288,074, a reduction of 21,619 as compared with July, according to preliminary statistics issued by the Interstate Commerce Commission. This was a reduction of 14.94 per cent as compared with August of last year and of 20.8 per cent as compared with August, 1929. The number of maintenance of way employees was reduced 38 per cent.

Barge Line Shows Increased Net

The Inland Waterways Corporation had a net operating income of $150,747 for the first eight months of 1931, as compared with $28,861 for the corresponding period of 1930, according to a statement made by General T. Q. Ashburn, chairman and executive of the corporation, in an address at Charleston, W. Va., on October 12. He said that this was after including in the operating expenses for the period $314,330 for depreciation.

Rehearing in Los Angeles Station Case Denied

The Supreme Court of the United States on October 12 declined to grant a rehearing asked by the railroads serving Los Angeles on its decision of May 18 which had sustained the validity of an order of the California Railroad Commission requiring the construction of a union passenger terminal at Los Angeles by the Atchison, Topeka & Santa Fe, the Los Angeles & Salt Lake and the Southern Pacific, at a cost estimated at $10,000,000.

U. S. and Canada to Discuss Waterway Treaty

Negotiations between representatives of the United States and of Canada looking to the framing of a treaty covering questions involved in the proposal for a St. Lawrence river waterway will be initiated at once, the State Department has announced. President Hoover, it was stated, has agreed to the wish of the Canadian government that the negotiations be carried on by direct and verbal exchange of views instead of by a joint commission.

Mileage Limitations for Trainmen Adopted by 46 Railroads

A total of 46 railroads in the United States have adopted the mileage limitation for railway trainmen recommended at the convention of the Brotherhood of Railway Trainmen at Houston, Tex., in May, as a means of providing employment for additional men. The resolution adopted at the convention provides that brakemen and switchmen in yard service may work not to exceed 208 hours each month, and that brakemen in road service must give way to other employees after they have completed 3,500 miles in freight service or 5,500 miles in passenger service. Of the railroads which have adopted these limitations, 16 are in the West, 19 in the East and 11 in the Southeast.

Two $4,000 Jobs

The United States Civil Service Commission is to hold in the near future examinations for the positions of inspector of safety appliances and inspector of hours of service under the Interstate Commerce Commission. The salary of each position is $4,000 a year, but the circular adds that there are no vacancies at the present time. Applications must be on file at Washington not later than November 12. Examinations will be held all over the country, wherever applicants appear. No person can take both examinations.

Boulder Dam Creates Rail Travel

Because of numerous requests for transportaion to Boulder Dam, located at Boulder City, Nev., the Union Pacific and the Chicago & North Western are offering a side trip, for passengers traveling to Southern California over these roads. It is from Las Vegas, Nev., to the dam and return. Passengers may now leave their trains at Las Vegas, ride to Boulder dam in the motor coaches of the Interstate Transit Line, inspect the dam site, and, after spending several hours in Las Vegas, depart that night on the Gold Coast Limited or the Los Angeles Limited for Los Angeles.

Yellowstone Rail Travel Low

According to preliminary figures compiled by the National Park Service of the United States Department of the Interior, total railroad travel to Yellowstone Park during the 1931 season amounted to 18,929 persons, as compared with 26,845 in 1930 and 38,979 in 1929. A relatively smaller reduction occurred among automobile visitors, the total for 1931 being 180,380, as compared with 194,771 in 1930 and 214,585 in 1929. The number of automobiles visiting the park remained practically constant, the total in 1931 being 63,636; in 1930, 63,408, and in 1929, 68,415.

Freight Traffic in August

The freight traffic handled by the Class I railroads in the first eight months of 1931 amounted to 233,954,307,000 net ton-miles, according to reports compiled by the Bureau of Railway Economics. This was a reduction of 51,308,415,000 net ton-miles, or 18 per cent under the traffic for the corresponding period in 1930, and a reduction of 28.1 per cent under that of the same period in 1929.

Railroads of the Eastern district for the eight months reported a reduction of 17.9 per cent in the volume of freight traffic handled compared with the same period in 1930, while the Southern district reported a decrease of 17.8 per cent. The Western district reported a decrease of 18.2 per cent.

For August, freight traffic handled by

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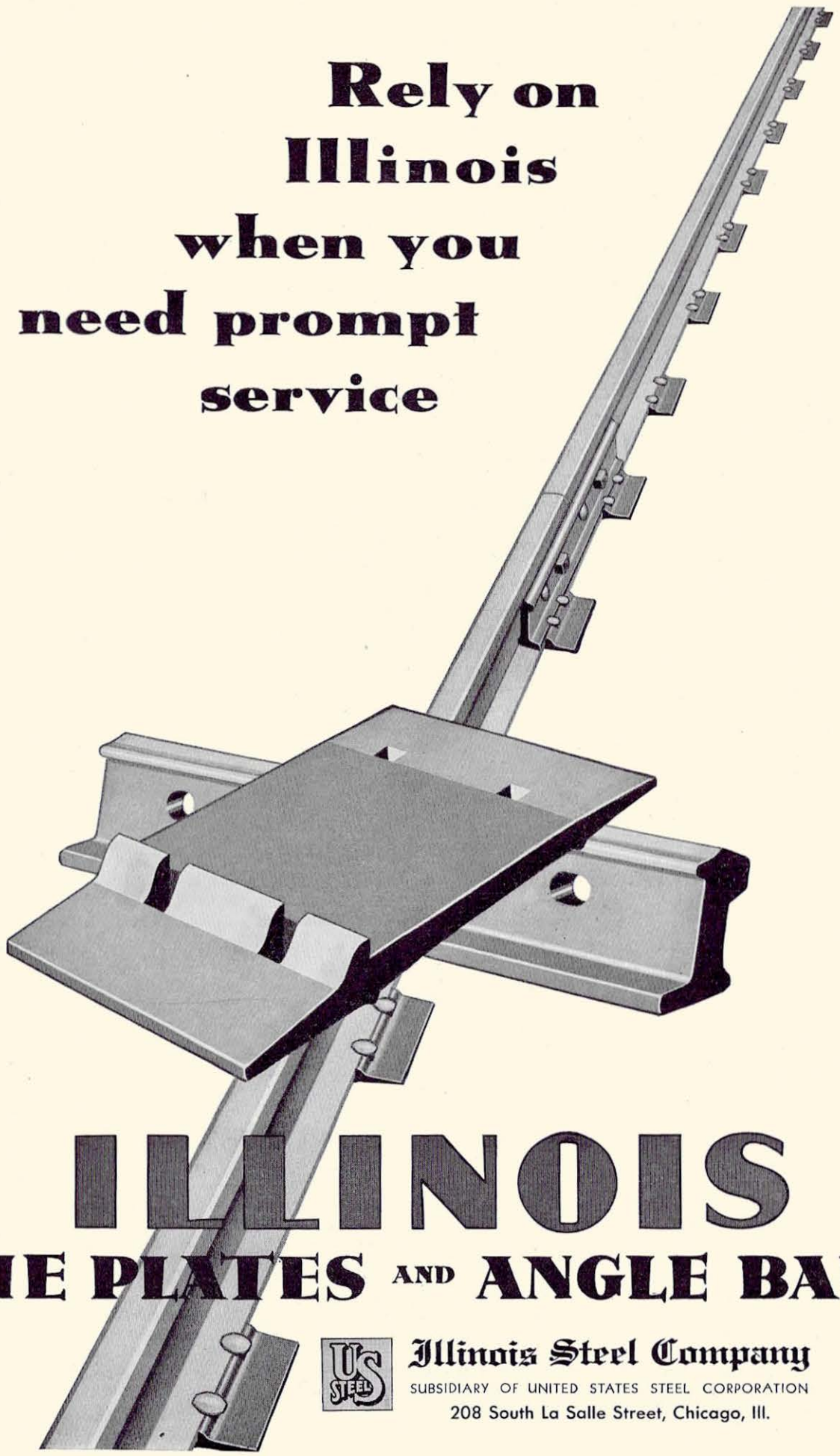
Rely on Illinois when you need prompt service



ILLINOIS
TIE PLATES AND ANGLE BARS

Illinois Steel Company
SUBSIDIARY OF UNITED STATES STEEL CORPORATION
208 South La Salle Street, Chicago, Ill.

the Class I railroads amounted to 29,347,925,000 net ton-miles. Compared with August, 1930, this was a reduction of 8,074,682,000 net ton-miles or 21.6 per cent, and it was a reduction of 34.7 per cent under August, 1929. In the Eastern district, the volume of freight traffic handled in August was a reduction of 19.3 per cent compared with the same month in 1930, while the Southern district reported a decrease of 19.9 per cent. The Western district reported a decrease of 24.8 per cent.

Railroads and Scrap Dealers Confer

A committee of the Purchases and Stores division of the American Railway Association met with a committee of the Institute of Scrap Iron and Steel at Pittsburgh on October 14, to confer on a revision of scrap classifications and other items involved in the monthly railroad scrap lists. The railroad committee consists of J. C. Kirk, assistant general storekeeper, Chicago, Rock Island & Pacific, chairman; A. L. Prentice, supervisor of scrap and reclamation, New York Central; James Young, assistant purchasing agent, Pennsylvania; T. J. Hegeman, superintendent of reclamation, Chicago, Burlington & Quincy; G. W. Lieber, superintendent of reclamation, Missouri-Kansas-Texas, and J. J. Collins, general foreman of scrap and reclamation, Erie.

Committee Reports on Waterway Legislation

Majority and minority reports on proposed waterway legislation were submitted to the board of directors of the Chamber of Commerce of the United States at its October meeting by the committee on Inland Waterway Transportation. A majority recommended changes in the law to permit transfer of parts of the government barge lines to private operation under conditions to assure continuance of service. A minority, while favoring eventual private operation, believed that the lines on the entire Mississippi system should be dealt with as a unit and that government operation should be continued until channels, terminals and joint routes and rates have been completely established. The report will be acted on by the board at its November meeting.

Missouri Pacific Committees to Perfect Freight Handling

The Missouri Pacific is conducting a "No Exception" campaign during October to reduce loss and damage payments. General committees have been organized on each division, with superintendents as chairmen. These committees hold meetings with the division staffs, division committees and other employees. In addition, the division chairman appoints on each district of his division a committee consisting of an agent as chairman, a telegrapher, a conductor, a brakeman, an engineman, a fireman and a section foreman; as well as yard committees, consisting of an agent as chairman, a yardmaster, an engine foreman, a switchman, a yard engineman, a fireman, a telegrapher and a yard foreman.

The purpose of organizing these committees is to promote general interest in the campaign to determine the causes which result in claim payments and then to decide upon the action necessary to prevent further exceptions. To check rough handling, impact recorder tests are made in connection with the movement of trains over each division and the records are given to the superintendents.

Agents at the larger loading stations have also organized office and warehouse committees which hold meetings twice weekly in an effort to interest station employees in the campaign.

D. L. & W. Veterans Urge Drastic Bus-Truck Curb

The Veterans Association of the Delaware, Lackawanna & Western at its annual meeting held at Elmira, N. Y., last month, adopted a long resolution with regard to subsidized highway transportation. After summarizing the magnitude of the railway industry and its importance as a purchaser of materials and employer of labor, the resolution dealt with the growth of commercial motor transport and the expense to the taxpayers and danger to private motorists resulting therefrom. Attention was called to the fact that more people were killed in the past eighteen months by automobiles than were killed in battle during the 18 months of America's participation in the World War. Following this citation, the resolution recommended the passage of bills in the states through which the D. L. & W. operates prohibiting the operation of motor vehicles of over three tons' capacity and of passenger vehicles, for profit, seating more than seven passengers.

Local committees have been set up at various points served by the railroad under chairmen appointed by John Draney, president of the association, with the purpose of bringing this point of view before aspirants for public office and other leading citizens.

Charge for Extra Passenger Suspended

The Interstate Commerce Commission has suspended from October 15 until May 15, 1932, the operation of tariff schedules published by the Pullman Company and the Canadian National, the Canadian Pacific, the Chicago, Milwaukee, St. Paul & Pacific and the Minneapolis, St. Paul & Sault Ste. Marie, proposing to establish a charge of 20 per cent of the lower-berth fare to be applied when an extra passenger occupies an upper-berth, lower berth or section of a sleeping car, between points in the United States. At present no charge is made for the second passenger, it being necessary only that the second passenger be provided with proper railroad transportation when occupying a berth with the first passenger who holds both railroad and sleeping car transportation.

The Pullman Company, in proposing the increase, had informed the commission that it was in "urgent need" of additional revenues and that 97 per cent of its revenues are required to meet operating expenses. The tariffs were suspended on protests filed by the Travellers' Protective Association, the Paramount Publix Corporation, and Fanchon & Marco, Inc. The latter organization said it was its practice to provide for one lower berth for two boys or girls in its traveling companies.

Proposes Electrification to End Depression

Joshua D'Esposito, who was chief engineer in charge of the construction of the Chicago Union station and is now a consulting engineer in Chicago, has proposed railway electrification as a way out of the business depression, his plan being to electrify 50,000 miles of trunk lines with the aid of a federal loan, sponsored by the government as any other emergency measure. Such a proposal, according to the author, presents no insurmountable difficulties, and it would not require interminable planning. To electrify trunk lines to the extent of 50,000 miles, would, he estimates, involve an expenditure of about $3,000,000,000.

"I propose that this work be considered one of national emergency and its financing be accomplished in the same manner as if the financing of railroad needs was for war purposes," Mr. D'Esposito says. "My suggestion would be to loan $3,000,000,000 to the railroads at only a slightly higher rate of interest than that paid by the government; the railroads to be given not less than five years to the first interest payment (interest in the meantime being cumulative and added to the capital) and that the whole problem be regarded as one of national emergency."

Employees Aid the G. M. & N.

President Tigrett of the Gulf, Mobile & Northern and the New Orleans Great Northern in a recent circular to employees has outlined the aid they are giving the company and asks for the continuance of this assistance for three more months. The text of the circular follows in full:

"TO ALL CONCERNED:

"On July 9th, last, announcement was made that, beginning with July 1, a plan would become effective under which officers of the Gulf, Mobile and Northern Lines would contribute ten per cent of their compensation to the companies for a period of three months.

"Excluding those in train service, the percentages of officers and employees making the contribution are as follows:

Gulf, Mobile & Northern	95%
New Orleans Great Northern	89%
System	94%

"In addition the following percentages of train service employees participated:

Gulf, Mobile & Northern	25%
New Orleans Great Northern	1%
System	17%

"It was thought that by this time conditions would have materially improved. However, it is with extreme regret that we are forced to recognize that, instead of improving, our situation has grown worse to the extent that at the close of September the Gulf, Mobile and Northern Lines lacked nearly $250,000.00 of having earned enough to pay operating

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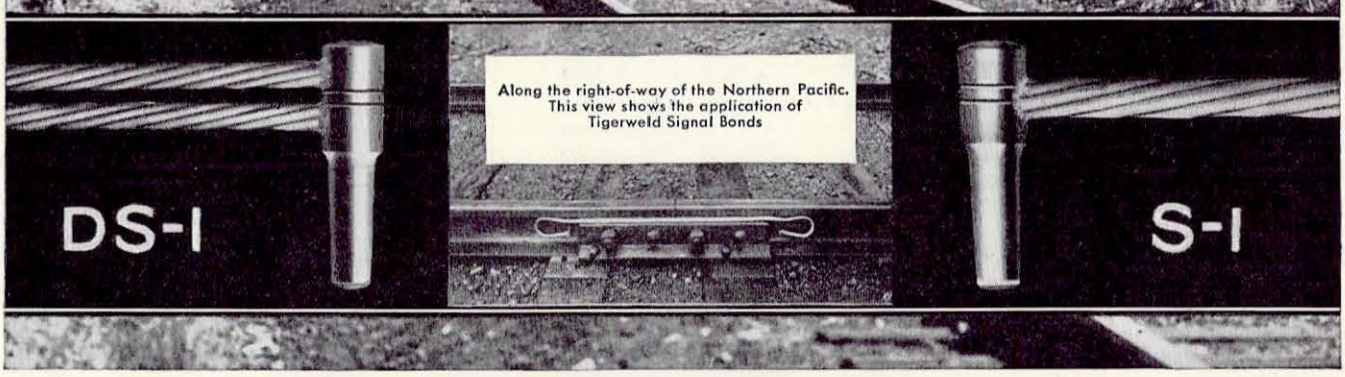
TIGERWELD PLUG TYPE SIGNAL BONDS

THERE is no substitute for unvarying quality in signal bond construction. And—so—the Northern Pacific—like other leading railroads—depends 100% on Tigerweld Signal Bonds for the efficient operation of its signal equipment. Experience proves that these Bonds—either in the single or duplex type—offer flexibility and low cost—and withstand severe mechanical abuse and have a low resistance that adds greatly to the safety of the track circuit. You are invited to write for further information.

STANDARD *Equipment on the Northern Pacific*



Along the right-of-way of the Northern Pacific. This view shows the application of Tigerweld Signal Bonds

1831 COMMEMORATING AMERICAN STEEL & WIRE COMPANY 100 YEARS of PROGRESS IN WIRE MAKING 1931

AMERICAN STEEL & WIRE COMPANY

208 South La Salle Street, Chicago SUBSIDIARY OF UNITED STATES STEEL CORPORATION And All Principal Cities

Pacific Coast Distributors: Columbia Steel Company, Russ Building, San Francisco *Export Distributors:* United States Steel Products Company, New York

expenses, interest and taxes. Therefore it is necessary that we continue our contribution for at least another three months.

"Recently the President of a large corporation told me that the policy of his Company had been to temporarily make two employees do the work which three had heretofore performed, thus dropping from the payroll the third employee. Our idea has been to keep as many employees at work as possible. However, every one of us must recognize the necessity either of adding to our income or reducing our operating expenses, and the burden involved should fall upon all alike. The fairest way of accomplishing this, without entailing a greater sacrifice upon one person than upon another, is for every employee to contribute his ten per cent.

"There are thousands of people who are interested in the success of the Gulf, Mobile and Northern Lines, many of them being directly or indirectly dependent upon us either for a livelihood or for transportation service. In many parts of the United States notice has been taken of the loyal and helpful attitude of the employees of the Gulf, Mobile and Northern Lines. That we will continue the same loyalty and co-operation during the period of stress through which we are going I have no doubt, and this announce-

Operating Revenues and Operating Expenses of Class I Steam Railways in the United States

Compiled from the Monthly Reports of Revenues and Expenses for 171 Steam Railways, Including 17 Switching and Terminal Companies.

FOR THE MONTH OF AUGUST, 1931 AND 1930

Item	United States		Eastern District		Southern District		Western District	
	1931	1930	1931	1930	1931	1930	1931	1930
Average number of miles operated	243,072.64	242,715.18	60,293.66	60,333.90	46,170.56	46,119.45	136,608.42	136,261.83
Revenues:								
Freight	$280,103,375	$354,688,693	$114,784,313	$144,595,015	$51,612,669	$60,797,572	$113,706,393	$149,296,106
Passenger	49,183,115	67,432,777	28,898,666	38,097,237	5,000,109	7,212,740	15,284,340	22,122,800
Mail	8,398,831	8,868,707	3,275,861	3,440,788	1,401,374	1,453,674	3,721,596	3,974,245
Express	5,618,134	8,316,764	2,694,966	3,675,571	749,370	904,494	2,173,798	3,736,699
All other transportation	12,350,239	15,263,060	7,092,440	8,975,894	848,023	953,041	4,409,776	5,334,125
Incidental	8,208,739	11,031,908	4,192,170	5,530,574	970,054	1,183,491	3,046,515	4,317,843
Joint facility—Cr.	939,519	1,105,874	299,068	396,255	176,074	182,237	464,377	527,382
Joint facility—Dr.	276,911	265,316	65,745	82,843	25,876	30,101	185,290	152,372
Railway operating revenues	364,525,041	466,442,467	161,171,739	204,628,491	60,731,797	72,657,148	142,621,505	189,156,828
Expenses:								
Maintenance of way and structures	37,165,241	63,013,894	20,520,143	27,534,471	8,505,278	9,916,478	18,139,820	25,562,945
Maintenance of equipment	66,086,950	80,806,783	30,707,462	37,126,461	11,980,334	14,432,704	23,399,154	29,247,618
Traffic	9,684,127	10,312,518	3,807,655	3,917,249	1,770,350	1,943,398	4,106,122	4,451,871
Transportation	128,947,695	154,083,516	61,134,639	71,805,319	20,661,053	23,813,395	47,152,003	58,464,802
Miscellaneous operations	3,548,578	4,542,267	1,695,614	2,030,275	336,048	414,737	1,516,916	2,097,255
General	14,809,136	15,610,288	6,467,197	6,835,298	2,621,535	2,651,306	5,720,404	6,123,684
Transportation for investment—Cr.	778,288	1,119,211	185,761	201,216	90,958	80,055	501,569	837,940
Railway operating expenses	269,463,439	327,250,055	124,146,949	149,047,857	45,783,640	53,091,963	99,532,850	125,110,235
Net revenue from railway operations	95,061,602	139,192,412	37,024,790	55,580,634	14,948,157	19,565,185	43,088,655	64,046,593
Railway tax accruals	28,081,885	32,185,421	12,170,198	13,643,235	4,521,791	5,587,300	11,389,896	12,954,886
Uncollectible ry. revenues	65,349	52,174	18,117	17,404	18,426	11,883	28,806	22,887
Railway operating income	66,914,368	106,954,817	24,836,475	41,919,995	10,407,940	13,966,002	31,669,953	51,068,820
Equipment rents—Dr. balance	8,432,085	8,362,097	4,390,592	4,094,476	d 28,801	d 378,251	4,070,294	4,645,872
Joint facility rent—Dr. balance	2,623,547	2,575,048	1,503,479	1,482,741	302,589	256,396	817,479	835,911
Net railway operating income	55,858,736	96,017,672	18,942,404	36,342,778	10,134,152	14,087,857	26,782,180	45,587,037
Ratio of expenses to revenues (per cent)	73.92	70.16	77.03	72.84	75.39	73.07	69.79	66.14

FOR EIGHT MONTHS ENDED WITH AUGUST, 1931 AND 1930

Average number of miles operated	242,898.81	242,705.56	60,289.79	60,349.37	46,130.12	46,137.56	136,478.90	136,218.63
Revenues:								
Freight	$2,244,233,325	$2,744,453,084	$948,482,213	$1,181,461,353	$428,322,824	$507,379,651	$867,428,288	$1,055,612,080
Passenger	391,618,331	514,025,616	222,790,558	280,824,563	48,897,116	68,724,579	119,930,657	164,476,474
Mail	69,494,912	73,247,258	26,778,510	27,970,338	11,741,052	12,276,042	30,975,350	33,000,878
Express	57,800,872	77,091,933	24,887,766	34,380,189	9,567,375	11,445,171	23,345,731	31,266,573
All other transportation	97,940,385	121,024,466	56,903,921	70,623,317	7,328,988	8,851,579	33,707,476	41,549,570
Incidental	62,519,645	79,670,591	33,157,696	41,068,170	8,769,885	10,793,252	20,592,064	27,809,169
Joint facility—Cr.	7,774,218	8,844,430	2,486,362	3,003,022	1,408,069	1,581,419	3,879,787	4,259,989
Joint facility—Dr.	2,272,794	2,561,422	602,996	775,958	202,633	267,884	1,467,145	1,519,580
Railway operating revenues	2,929,108,894	3,615,795,956	1,314,884,030	1,638,556,994	515,832,656	620,783,809	1,098,392,208	1,356,455,153
Expenses:								
Maintenance of way and structures	385,394,451	502,847,524	162,183,999	209,628,273	72,275,113	88,719,165	150,935,339	204,500,086
Maintenance of equipment	576,673,027	709,759,001	267,355,898	328,384,883	103,886,968	127,894,465	205,430,161	253,479,653
Traffic	80,438,242	87,864,347	31,151,043	33,534,266	14,867,103	16,145,344	34,420,096	38,184,737
Transportation	1,075,645,981	1,274,129,119	507,520,312	600,775,226	177,010,023	204,970,171	391,115,646	468,383,722
Miscellaneous operations	29,056,869	36,392,686	14,099,520	17,070,461	3,421,179	4,410,514	11,536,170	14,911,711
General	124,116,776	130,563,376	54,167,639	57,265,307	21,703,146	22,097,295	48,245,991	51,200,774
Transportation for investment—Cr.	4,960,394	8,738,610	907,391	1,743,467	598,915	760,767	3,454,088	6,234,376
Railway operating expenses	2,266,364,952	2,732,817,443	1,035,571,020	2,244,914,949	392,564,617	463,476,187	838,229,315	1,024,426,307
Net revenue from railway operations	662,743,942	882,978,513	279,313,010	393,642,045	123,268,039	157,307,622	260,162,893	332,028,846
Railway tax accruals	221,626,835	243,817,706	90,401,856	100,776,154	41,496,538	45,897,354	89,728,441	97,144,198
Uncollectible ry. revenues	531,691	663,269	191,932	264,525	119,450	114,707	220,309	284,037
Railway operating income	440,585,416	638,497,538	188,719,222	292,601,366	81,652,051	111,295,561	170,214,143	234,600,611
Equipment rents—Dr. balance	68,874,311	64,068,813	34,026,956	32,624,315	4,591,405	1,221,498	30,255,950	30,223,000
Joint facility rent—Dr. balance	20,767,325	17,962,467	11,508,915	9,098,297	2,212,414	1,941,422	7,045,996	6,922,748
Net railway operating income	350,943,780	556,466,258	143,183,351	250,878,754	74,848,232	108,132,641	132,912,197	197,454,863
Ratio of expenses to revenues (per cent)	77.37	75.58	78.76	75.98	76.10	74.66	76.31	75.52

d Deficit or other reverse items.

Compiled by Bureau of Statistics, Interstate Commerce Commission. Subject to Revision.

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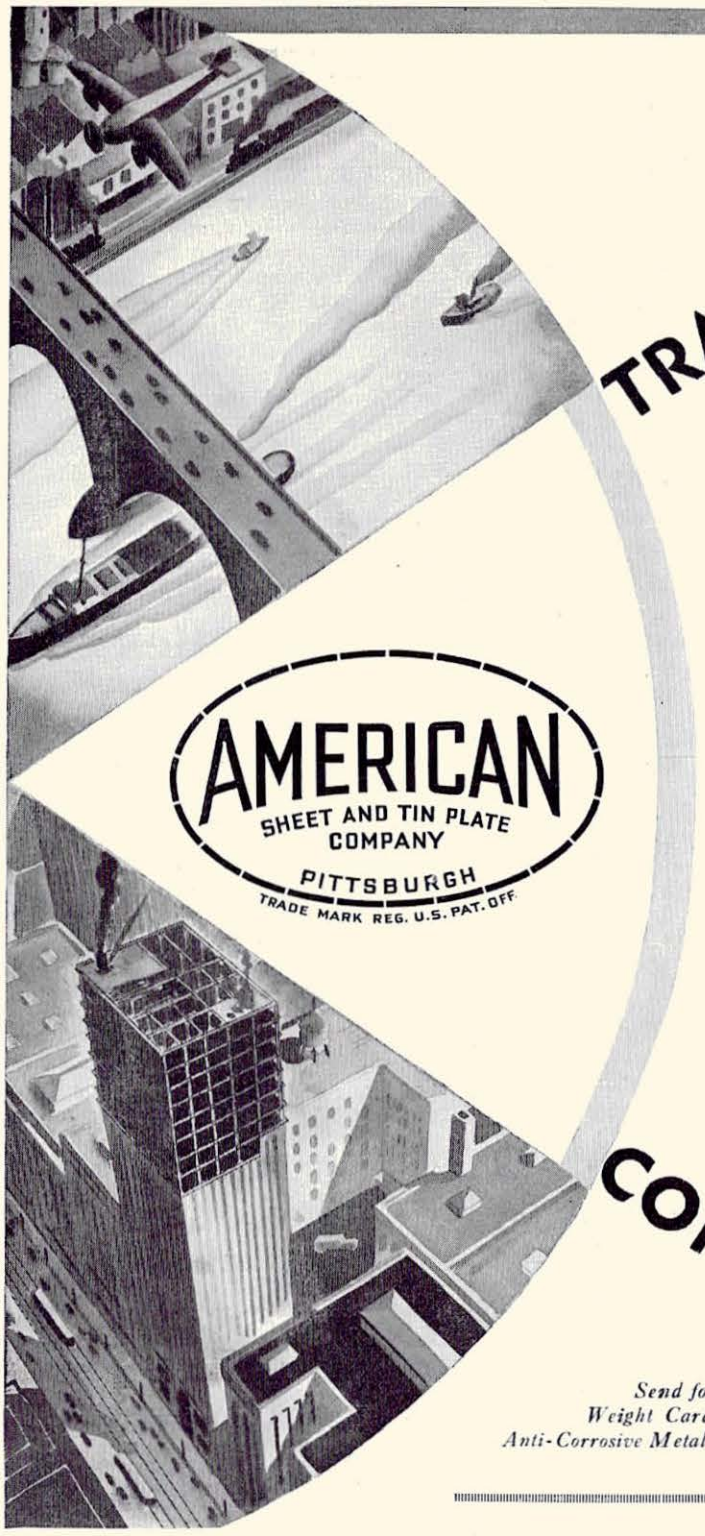

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ILLINOIS STEEL COMPANY
MINNESOTA STEEL COMPANY
NATIONAL TUBE COMPANY
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Pacific Coast Distributors—Columbia Steel Company, Russ Building, San Francisco, Calif.
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ment assumes that not only will there be a continuance on the part of those already contributing but that with a fuller understanding of our necessities we may expect the support of the comparatively few who were not included during the past three months.

"Let me say that I am not unmindful of the sacrifice which is entailed by any added burden upon our personal incomes. However, I think we all agree that a sacrifice of this character is much better than the larger one which would come if the Gulf, Mobile and Northern Lines should meet financial disaster. I am sincerely hoping that there may soon be a change for the better, so that we may all again enjoy the full benefit of our normal incomes.

I. B. TIGRETT,
President.

Congress Asked to Revise Railroad Law

(*Continued from page 608*)

these depressed times. An immediate repeal of this statute and a revision of the unsound rate-making rules will do more to re-establish public confidence and the impaired credit of railroads generally than anything else that can be done by the coming Congress."

"It seems to be generally recognized," the letter also said, "that some federal regulation of automobile bus traffic in interstate commerce should be speedily adopted and shippers appear to look with favor upon the general plan for co-operation between the Interstate Commerce Commission and the respective state regulatory bodies dealing with this subject. The extent to which the railroads should be permitted to engage in such transportation and also the extent to which they should now withdraw from unremunerative passenger train service is a subject upon which efforts will be made to reach an agreement, and Congress will be asked to consider legislation in line therewith.

"The development of highway transportation by motor trucks has been so varied and rapid that as yet no shippers' organization has been able to reach any final conclusions as to the requirements of legislation in connection therewith. There are some features upon which it is thought the majority of the shippers will agree as to a remedy. One of the great difficulties encountered by the carriers today in meeting both highway and water competition is the rigidity of the provisions of the fourth section of the act. In many instances carriers cannot meet short-haul motor truck competition without laying themselves liable to the prohibitions of the fourth section. For example, the requirement that a through rate should not exceed the combination of intermediate local rates becomes an effective barrier in a way that was never dreamed of before motor truck transportation was developed. For several years the league has felt that the provisions of the fourth section were too rigid to enable the carriers to meet competition in cases where the meeting of such competition would not place undue burden upon other transportation.

"There are several matters upon which shippers are anxious to obtain some legislation. They desire legislation which will give them the same right in substance to appeal from an order of the commission as the railroads have; they desire an amendment to the provisions of the law which gives the carrier the unqualified right to demand the longest possible haul in any route comprising two or more carriers, so as to enable the commission to establish just and reasonable through rates when the public interest requires it; they desire restriction upon the minimum rate-making power of the commission, so as to restrict it to those cases where the rates are shown not to be compensatory; and together with the carriers, they desire the adoption of an adequate permanent program for railroad consolidation which will permit voluntary consolidations, and at the same time substantially preserve existing carrier competition.

"The shippers desire that the railroads shall prosper, but realize that in times of depression, like the present, when industry has relatively little to give the railroads they cannot be expected to prosper. It is during times like the present that we can best map out a program of future regulation which in the end will preserve to the public those means of transportation which are most efficient and economical."

The special committees representing the railroads and the National Industrial Traffic League met in New York on October 15 for additional consideration of action to be taken on these and other pending proposals for railroad legislation, at which time "an effort was made to find a common ground as far as can be done through such mutual exchange of views." Railroad representatives expected to attend this meeting were W. R. Cole, president, Louisville & Nashville and chairman of the committee representing the American Railway Association, and L. A. Downs and J. J. Pelley, presidents, respectively, of the Illinois Central and the New York, New Haven & Hartford. Shippers' representatives on the joint committee include, in addition to Mr. Fulbright, W. J. Mathey, vice president, Shippers' Conference of Greater New York; J. P. Haynes, Chicago Association of Commerce; and I. F. Lyons, California Packing Company, San Francisco, Cal.

Five Roads File Truck Body Rates

(*Continued from page 608*)

City and Baltimore, $28, $35, and $42; between Baltimore and Richmond, Va., $24, $30, and $36. It is understood that the Pennsylvania tariff includes similar rates but it was not available for inspection at the time the inquiry was made. The Central of New Jersey tariff also names the same rates between Jersey City and Baltimore. The Lackawanna tariff names rates of $29, $36 and $43 between Hoboken or Jersey City and Scranton, Pa. All of the tariffs include similar language in the rules and notes, stating that the railroad responsibility does not begin until the truck body is in course of transfer by crane from truck or trailer to car and ends when the body is delivered to truck or trailer. Packing and loading is to be done by the shipper and the railroads are not responsible for results of improper packing. When equipped with side or end doors the truck bodies must have suitable locking or sealing devices, to be provided by shippers, and to be removable by consignees.

A number of eastern railroads also have filed with the commission tariffs proposing flat rates per 100 pounds for mixed carloads of all freight, except perishables, explosives, fragile articles, etc., such as 24 cents from Jersey City to Scranton, 20 cents from Allentown to Jersey City, 24 cents from Hoboken to Scranton, 17 cents from Allentown to Philadelphia. Some such tariffs had been filed previously by certain roads serving the Northwest but are rather new in the East.

Equipment and Supplies

FREIGHT CARS

THE UNITED STATES NAVY DEPARTMENT has ordered eight flat cars of 40 tons' capacity from the Magor Car Corporation.

PASSENGER CARS

THE BOARD OF TRANSPORTATION, CITY OF NEW YORK, has awarded a contract for 500 steel passenger cars for subway service to the American Car & Foundry Company, at a cost of $10,531,500. Contracts were also let for the motors on these cars to the General Electric Company, at $2,392,500; and for the control equipment to the Westinghouse Electric & Manufacturing Company, at $1,230,000.

IRON & STEEL

THE CANADIAN PACIFIC has ordered 6,500 tons of 100-lb. C. P. R. standard steel rail from the Dominion Steel & Coal Corporation, for use on the main line east of Fort William.

SIGNALING

THE BALTIMORE & OHIO has ordered from the General Railway Signal Company an electric interlocking, 32 levers, for Clifton Junction, Staten Island, N. Y.

THE NEW YORK RAPID TRANSIT COMPANY has ordered from the General Railway Signal Company color-light signals, automatic stop apparatus and other material for installation on its Culver line.

THE BOARD OF TRANSPORTATION, CITY OF NEW YORK, has awarded to the General Railway Signal Company, at a cost of $2,317,800, the contract for the signals in the Concourse line of the new subway system from one Hundred and Forty-first street to Webster avenue.

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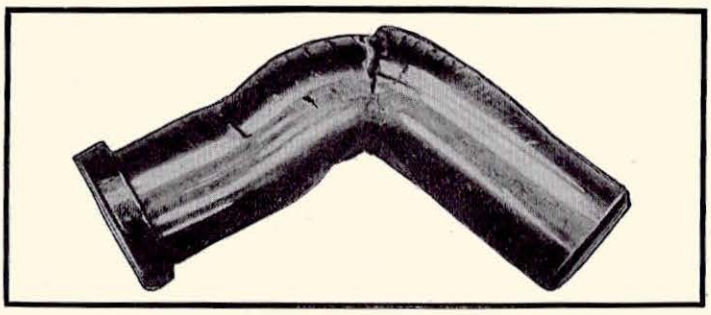
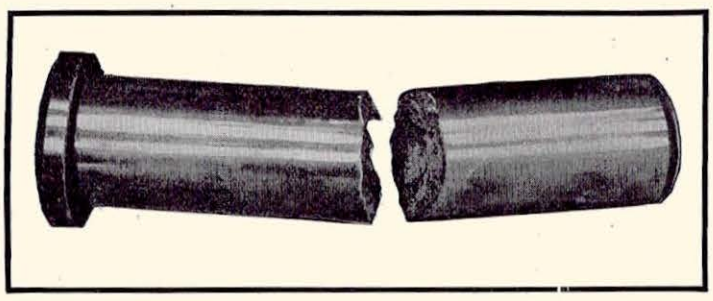
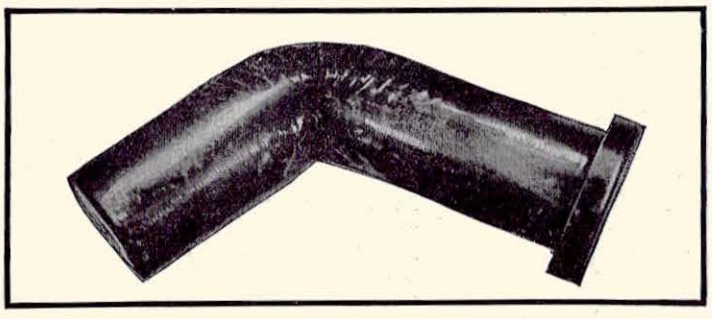
WROUGHT IRON



STEEL



AGATHON NICKEL IRON



These pins all have the same surface hardness and case depth. They were tested on a V-block under a steam hammer. Note toughness of Agathon Nickel Iron.

Are Your Pins Tough or Brittle?

- How well equipped are your spring and brake rigging pins to withstand sudden shocks and extreme loads?
- Such pins, of course, have a hard surface to resist wear. But underneath this surface they should be tough, not brittle.
- Agathon Nickel Iron has a reputation for toughness. Observe the test illustrated above and note the toughness of the Agathon Nickel Iron under repeated hammer blows.
- This modern alloy iron is ideal for all case-hardened work. There are no slag spots or seams, and warping is almost negligible. Grinding is unnecessary and the finished cost with Agathon Nickel Iron is lower. Use it for all case-hardened pins and bushings.

CENTRAL ALLOY DIVISION

REPUBLIC STEEL

CORPORATION

Massillon, Ohio

AGATHON NICKEL IRON

Supply Trade

The Chicago Pneumatic Tool Company, New York, has moved its offices and service station at Seattle, Wash., from 1743 to 3201 First Avenue, South, and **C. Kirk Hillman** has been appointed district manager.

Francis D. West, manager of sales of the Paradon Company has returned to the service of the **Permutit Company,** New York, as district sales manager, with headquarters at 712 Brisbane building, Buffalo, N. Y. Mr. West was associated with the Permutit Company from 1918 until 1930.

Charles O. Guernsey, who has been appointed chief engineer of **The J. G. Brill Company,** Philadelphia, Pa., and its subsidiary companies, is now in charge of all Brill engineering activities. Mr. Guernsey has been connected with the Brill organization since 1923. For 10 years previous he was affiliated with the

Charles O. Guernsey

Service Motor Truck Company, Wabash, Ind., as chief engineer and later as vice-president in charge of the company's railroad division, the activities of which were transferred to the Brill Company in 1923, when Mr. Guernsey was appointed chief engineer, automotive car division. Under his direction the line of Brill rail motor cars for steam railroads was developed, and he has been interested in the design of electric railway rolling stock and other types of urban and interurban transportation equipment and of the electric trolley bus. Mr. Guernsey was appointed chief automotive engineer on January 1 last, remaining in that position until the recent unification of all Brill engineering activities under Mr. Guernsey's direction. He will be located at the Philadelphia plant.

Harry L. Erlicher, assistant purchasing agent of the **General Electric Company,** Schenectady, N. Y., has been appointed purchasing agent, succeeding **L. G. Banker,** retired. Mr. Erlicher entered the service of the General Electric Company as an office boy and was soon promoted to a clerical position. In 1910, he was appointed a buyer, and, since 1923, when the position of assistant purchasing agent was created, he has served in that capacity. L. G. Banker, who has retired as purchasing agent after completing 43 years continuous service with the company, entered the employ of the Thomson-Houston Electric Company, one of the predecessors of the General Electric Company, in 1888 as a clerk in the purchasing department. He went to Schenectady when that city was made the headquarters of the General Electric Company in 1894 and since 1914 has served as purchasing agent and head of the purchasing department.

OBITUARY

Albert Jefferson Sayers, an engineer of the Link-Belt Company, Chicago, died at his home in Chicago, on October 11, at the age of 61.

George Wagstaff, formerly traveling engineer of the American Arch Company, New York, who retired from active service about three years ago, died on October 11 at his home in West New York, N. J. He was born on March 29, 1858, at Shropshire, England. Mr. Wagstaff, who joined the American Arch Company in 1910, was well known in the railway field, having previously served since 1879 in various positions in the United States with the Lehigh Valley, the Rome Locomotive Works, the Delaware, Lackawanna & Western, the Grant Locomotive Works, the Chicago & North Western, and the New York Central, until 1903, when he was appointed assistant master mechanic of the Collinwood shops of the Lake Shore &

George Wagstaff

Michigan Southern (now part of the New York Central). He subsequently served as supervisor of boilers on the New York Central Lines from 1905 to 1908, and then with the American Locomotive Equipment Company until 1910, when he entered the service of the American Arch Company. Mr. Wagstaff was the first president of the Master Boilermakers' Association, and had served as chairman of its executive committee.

Construction

BOSTON & MAINE—DELAWARE & HUDSON.—The New York Public Service Commission has approved plans and estimates of cost for highway approaches in connection with the elimination of the Elnora and Dyers crossings of these two railroads in Clifton Park, N. Y.

BUFFALO, ROCHESTER & PITTSBURGH.—Revised general plans, specifications and an estimate of cost amounting to $51,270 for the reconstruction of the highway bridge carrying the Boston-Colden county highway over this company's tracks in Colden, N. Y., have been approved by the Public Service Commission of New York.

CANADIAN PACIFIC.—Contracts involving a total expenditure of approximately $400,000, for the construction of new buildings at West St. John, N. B., have been awarded by this company to E. G. M. Cape & Company. The new structures, all of which are necessary for the railroad's winter port business at St. John, and some of which are to replace buildings recently destroyed by fire, include grain offices; a battery charging plant; necessary equipment for handling passenger cars and an export cattle building.

CHICAGO & NORTH WESTERN.—A contract has been awarded to John Marsch, Inc., Chicago, for the grading in connection with the elevation of tracks of this company for a grade separation with United States Highway No. 141 near Fox Point, Wis. The contract involves 40,000 cu. yd. of material. A contract for the construction of the substructure of a highway subway near De Pere, Wis., has been let to Gaffin & Gehri, Fond du Lac, Wis.

CHICAGO GREAT WESTERN.—A contract has been awarded to Nicholas Wagner, Austin, Minn., for the construction at that point of a one-story brick fruit warehouse, 56 ft. wide and 86 ft. long, at a cost of about $20,000.

ERIE — DELAWARE, LACKAWANNA & WESTERN.—Plans, specifications and estimates of cost in connection with the elimination of a number of grade crossings of these two railroads in the towns of Big Flats and Horseheads, N. Y., have been approved by the New York Public Service Commission.

LONG ISLAND.—The Public Service Commission of New York has approved as not excessive a low bid of $51,122 submitted by the Good Roads Engineering & Contracting Company, Inc., Hempstead, Long Island, N. Y., for the elimination of the Carleton avenue grade crossing of the Long Island Railroad, one mile east of Islip station, Islip, L. I., N. Y. The commission has also approved a bid of $16,377 submitted by the same contractor for the reconstruction of the bridge carrying the Long Island tracks over North Sea road, Southampton, L. I., N. Y.

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BETTER FIRES

FIREBAR CORPORATION
CLEVELAND OHIO.

TEXAS & NEW ORLEANS.—This company has applied to the Interstate Commerce Commission for authority to construct a connecting track at Port Arthur, Tex., 980 feet, to connect its line with that of the Kansas City Southern.

Financial

CHICAGO & NORTH WESTERN.—*Bonds.*—This company has applied to the Interstate Commerce Commission for authority to procure authentication and delivery of $19,089,000 of first and refunding mortgage 4½ per cent bonds, to be held in the treasury until further order.

CHICAGO, BURLINGTON & QUINCY.—*Abandonment.*—This company has applied to the Interstate Commerce Commission for authority to abandon part of its branch line from Mt. Pleasant to Keokuk, Iowa, including that portion from Mooer to Hamill, 23.59 miles, and that from Salem to Mt. Pleasant, 10.35 miles.

CHICAGO, INDIANAPOLIS & LOUISVILLE.—*Bonds.*—This company has applied to the Interstate Commerce Commission for authority to conditionally issue $1,442,000 of first and general mortgage 6 per cent bonds in exchange for a like amount of 5 per cent bonds.

KANSAS CITY SOUTHERN.—*Chicago Great Western Acquires Interest.*—The Alleghany Corporation has sold its 20 per cent stock interest in this company to the Chicago Great Western.

LOUISVILLE & NASHVILLE.—*Bonds.*—The Interstate Commerce Commission has authorized this company to issue $10,000,000 of 10-year 5 per cent secured bonds to be sold to J. P. Morgan & Co. at 95¾, making the average annual cost to the railroad approximately 5.56 per cent. The bonds to be sold will be secured by the deposit of $13,900,000 of bonds of subsidiaries as collateral security.

PENNSYLVANIA. — *Bonds.* — The Philadelphia, Baltimore & Washington has applied to the Interstate Commerce Commission for authority to issue $5,000,000 of general mortgage 4½ per cent bonds to be delivered to the Pennsylvania.

PERE MARQUETTE.—*Further Hearings in Recapture Case.*—The Interstate Commerce Commission has announced that further hearings will be held at Washington on December 7 in the case in which it has sought to recapture $820,512 from this company as representing half its net railway operating income in excess of 6 per cent for the years 1922, 1923, and 1925, on the basis of a tentative report. The filing of a protest by the company acted as a stay of the order.

Average Prices of Stocks and of Bonds

	Oct. 13	Last week	Last year
Average price of 20 representative railway stocks .	47.50	44.47	99.73
Average price of 20 representative railway bonds..	79.03	77.24	94.97

Railway Officers

EXECUTIVE

J. A. Droege, Vice-President of New Haven, to Retire November 1

John A. Droege, vice-president and general manager of the New York, New Haven & Hartford, with headquarters at New Haven, Conn., will retire from active service on November 1, after a career of more than half a century in the operating departments of various railroads. He will, however, retain his connection with the New Haven, continuing in an advisory capacity with that company, which he has served for the past 27 years. Mr. Droege entered railway service in 1880, as telegrapher with the Baltimore & Ohio, and later served with the same road as agent and stenographer. He also served with the Chesapeake & Ohio; the Norfolk & Western; the East Tennessee, Virginia & Georgia (now part of the Southern); the Florida Southern (now part of the Atlantic Coast Line), and the Peninsular & Southern, in various capacities, and, in the latter part of 1898, entered the service of the Lehigh Valley as trainmaster. In 1900, he was appointed superintendent of the Pennsylvania and New York division

John A. Droege

of the same road, where he remained until 1904. On the latter date, Mr. Droege became superitendent of the New Haven, with headquarters at Providence, R. I. He was subsequently transferred, in the same capacity, to the Shore Line division and in September, 1913, was promoted to the position of general superintendent of the Western grand division. He remained in the latter position until May, 1917, when the New Haven was split into three grand divisions and Mr. Droege was appointed general superintendent of the newly created New York division and terminals. He was appointed general manager in October, 1925, and in November, 1929, he became also vice-president. In February, 1930, he was placed in charge of the New England Transportation Company, highway subsidiary of the New Haven, in addition to his other duties. Mr. Droege, generally recognized as one of the country's leading authorities on railroad operation, is also the author of three standard books on railway operating practices: namely, "Freight Terminals and Trains"; "Passenger Terminals and Trains," and "Yards and Terminals and Their Operation."

OPERATING

E. G. DeLong, assistant trainmaster on the Toledo division of the Pennsylvania, has been appointed assistant trainmaster and division operator on the same division, with headquarters at Toledo, Ohio, to succeed **C. J. Hickox,** who has retired.

Robert L. Pearson, assistant general manager of the New York, New Haven & Hartford, has been appointed general manager, and **James O. Halliday,** manager of transportation, and **Edward E. Regan,** general superintendent, have been appointed assistant general managers.

H. L. Margetts, general superintendent of the Michigan Central, with headquarters at Detroit, Mich., has been appointed superintendent of the Detroit terminals and the Detroit division, with headquarters at the same point, succeeding **G. E. Goodship,** whose death is noted elsewhere in these columns. **R. E. Laidlaw,** who has been acting superintendent and general agent of the Detroit terminals and Detroit division, has been appointed general agent, operating department, with headquarters as before at Detroit. The position of general superintendent has been abolished.

J. W. Hevron, general superintendent of the Northern lines of the Illinois Central, with headquarters at Chicago, has had his jurisdiction extended to include the Western lines. **W. S. Williams,** general superintendent of the Western lines, has been appointed superintendent of the combined Iowa and Minnesota divisions, known as the Iowa division, with headquarters as before at Waterloo, Iowa. The positions of superintendent of the Iowa and Minnesota divisions were discontinued several months ago, as noted in the *Railway Age* for March 7.

H. E. Roll, who for a number of months has been assigned to special work on the lines of the Missouri Pacific in the East Texas oil fields, has resumed his duties as superintendent of the Little Rock division, with headquarters at McGehee, Ark. Mr. Roll succeeds **J. S. Bassett,** acting superintendent, who has been re-appointed trainmaster of the Central division, with headquarters at Van Buren, Ark., to succeed **B. C. Murphy,** acting trainmaster, who has returned to his former position as trainmaster of the Louisiana division, with headquarters at Monroe, La. Mr. Murphy succeeds **R. H. Gragg,** who has been assigned to other duties.

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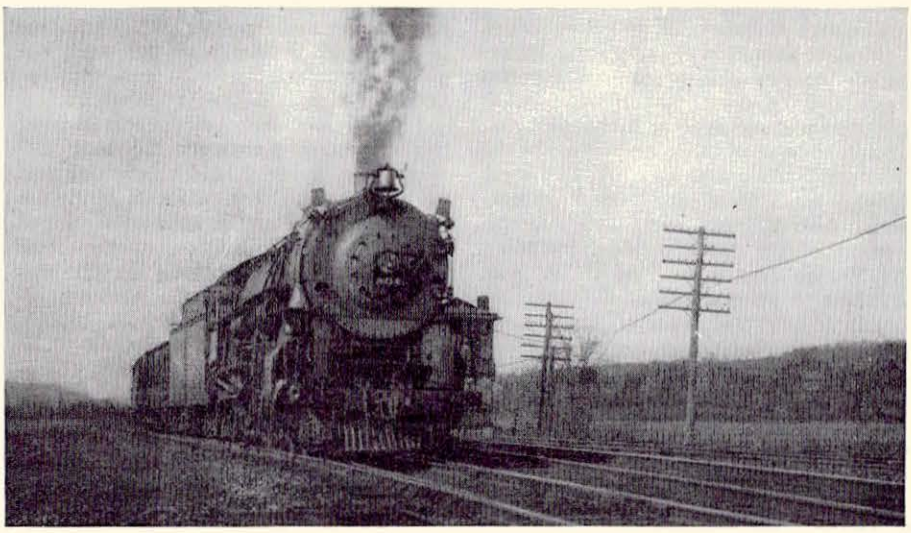
OPERATING ECONOMY



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HUNT-SPILLER GUN IRON

Air Furnace

Effective October 10, the New York Central re-arranged its operating supervision, the positions of general superintendent of eight general districts being discontinued and several divisions being consolidated with other divisions. In the territory Buffalo and East, **A. E. Lloyd**, general superintendent, New York terminal district, was appointed superintendent of the same district, including the marine department. **A. H. Wright**, assistant to general superintendent, was appointed assistant superintendent, same district, also including the marine department. **F. E. McCormack**, general superintendent at Buffalo, N. Y., has been appointed superintendent of the Buffalo division, succeeding **J. J. Brinkworth**, appointed assistant superintendent. **F. S. Risley**, general superintendent at Albany, N. Y., has been appointed superintendent of the Mohawk division, succeeding **H. Scott**, appointed superintendent of the Pennsylvania division, and **W. A. Hamler**, superintendent at Jersey Shore, Pa., has been appointed superintendent of the St. Lawrence division, succeeding **C. F. Moyer**. **L. Relyea**, assistant to general superintendent, New York Terminal district, has been appointed assistant superintendent of the River division, succeeding **F. W. Gleisner**. In the territory west of Buffalo, including the Ohio Central Lines, **E. Thwaites**, general superintendent at Toledo, Ohio, with jurisdiction over the Toledo Terminal district, the Cleveland division and the Ohio Central Lines, has been appointed superintendent at the same point, with jurisdiction over the Toledo Terminal district, the Toledo division and the Ohio Central Lines. **W. J. Galbroner**, superintendent of the Ohio division of the Ohio Central Lines, has been appointed assistant superintendent of the same division, with headquarters as before at Columbus, Ohio. **I. B. Chadwick**, superintendent of the Southern division of the Ohio Central Lines, with headquarters at Charleston, W. Va., has been appointed assistant superintendent of the same division, at the same point. **E. W. Brown**, superintendent of the Toledo division, has been appointed assistant superintendent of the Toledo Terminal district and the Toledo division, with headquarters at the same point, to replace **L. J. Petrot**, who has been appointed trainmaster at Toledo. **W. H. Sullivan**, general superintendent at Cleveland, Ohio, with jurisdiction over the Cleveland Terminal district and the Erie and Franklin divisions, has been appointed superintendent of the Cleveland Terminal district, at the same point, succeeding **J. D. Bell**, who has been appointed assistant superintendent of the same district. Mr. Bell relieves **G. H. Jedele**, who has been appointed trainmaster, with headquarters at the same point. **F. F. Riefel**, general superintendent, with headquarters at Chicago, has been appointed superintendent of the Western division, with headquarters at the same point, to succeed **W. P. Lamb**, who has been appointed assistant superintendent of the same division at the same point. Mr. Lamb replaces **J. P. Smilie**, who has been appointed trainmaster, with headquarters also at Chicago.

The Ottawa and Adirondack division has been merged with the Mohawk division. The Lansing, Mich., division has been split and consolidated with the middle division of the Michigan Central and the Toledo division of the New York Central. The Illinois division has been consolidated with the Western division, except for the Danville branch, which becomes part of the Cairo division of the Cleveland, Cincinnati, Chicago & St. Louis. The Michigan division of that road has been split between the Cleveland and Chicago divisions, with a small part going to the Michigan Central.

ENGINEERING AND SIGNALING

E. L. Crugar, engineer of construction of the Illinois Central at Chicago, has been appointed chief engineer of the Wabash at St. Louis, to fill a position held vacant for some time.

N. W. Brown, assistant engineer in the office of the chief engineer of the Missouri-Kansas-Texas, has been appointed to the newly-created position of industrial engineer, with headquarters as before at St. Louis, Mo.

Following the consolidation of the Iowa and Minnesota divisions of the Illinois Central into one division, known as the Iowa division, **W. R. Gillam**, division engineer of the Iowa division, with headquarters at Ft. Dodge, Iowa, has been appointed to the same position on the new division with headquarters at Waterloo, Iowa. **H. Rhoads**, division engineer of the Minnesota division, with headquarters at Dubuque, Iowa, has been assigned to other duties.

F. M. Thomson, district engineer of the North Texas district of the Missouri-Kansas-Texas, at Denison, Tex., has been transferred to Parsons, Kan., with jurisdiction over the St. Louis, Parsons and McAlester districts. **J. J. Gallagher**, district engineer of the South Texas district, at Smithville, Tex., has had his jurisdiction extended to include the North Texas district with headquarters at Denison. **R. C. Dunlay**, district engineer of the Parsons district at Parsons, Kan., has been assigned to other duties. The positions of district engineer of the St. Louis and McAlester districts, held by **W. W. Marshall** at Boonville, Mo., and **W. C. Pruett** at Muskogee, Okla., have been abolished and Mr. Marshall and Mr. Pruett have been assigned to other duties.

MECHANICAL

W. R. Lye, district superintendent of motive power on the New York Central, with headquarters at Collinwood, Ohio, has assumed also the duties of the superintendent of shops at the same point, succeeding **W. J. Shasberger**. The position of superintendent of shops has been abolished.

Martin F. Brown, general fuel supervisor of the Northern Pacific, with headquarters at St. Paul, Minn., has been granted an indefinite leave of absence on account of ill health. The duties of general fuel supervisor have been assumed by **Clarence E. Allen**, assistant to mechanical superintendent, with headquarters also at St. Paul.

G. B. Hart, assistant to the general superintendent of motive power of the Southern Pacific, Pacific lines, with headquarters at San Francisco, Cal., has been appointed superintendent of the Los Angeles (Cal.) general shops, succeeding **H. H. Carrick**, who has retired. The position of assistant to the general superintendent of motive power has been discontinued.

PURCHASES AND STORES

G. S. Wright, general storekeeper of the Elgin, Joliet & Eastern with headquarters at Joliet, Ill., will retire, effective October 17, after 35 years of continuous service with that road. **John Otto** has been appointed to succeed Mr. Wright.

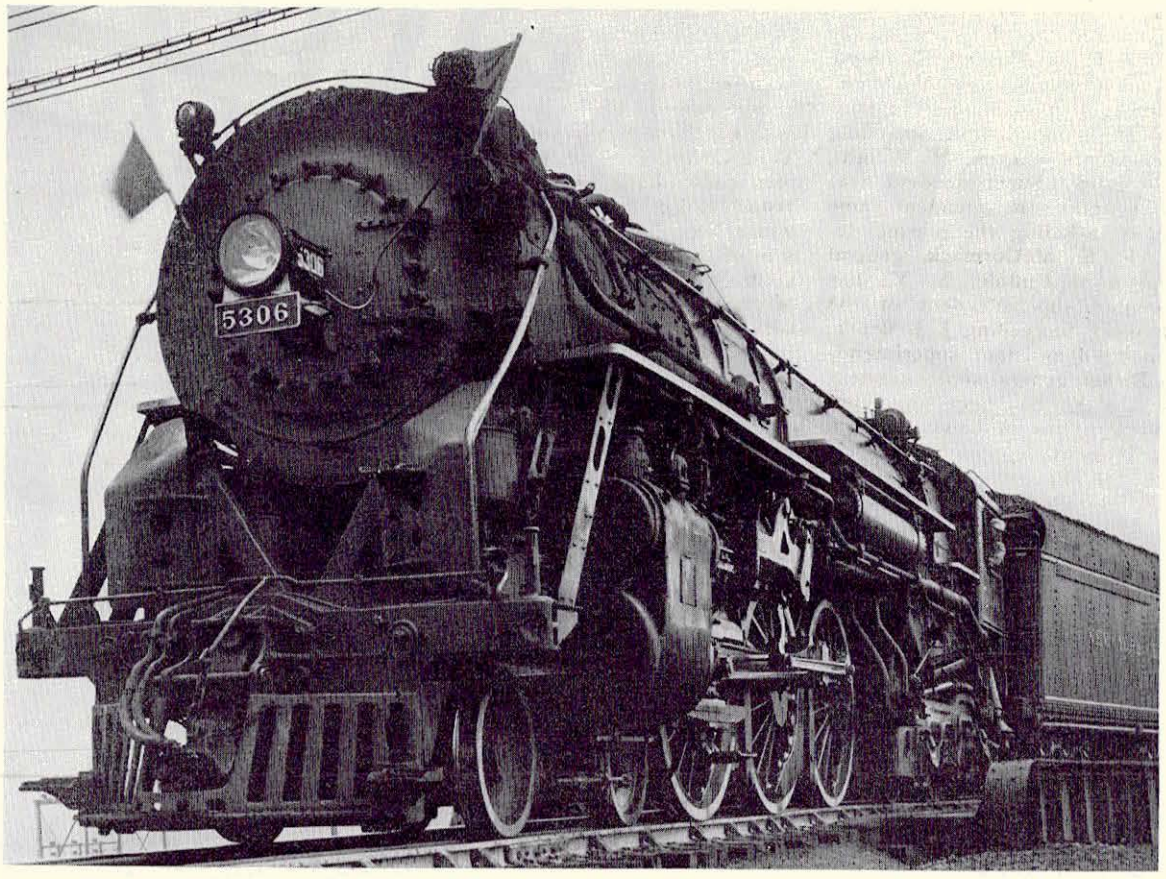
OBITUARY

G. E. Goodship, superintendent of the Detroit terminals and the Detroit division of the Michigan Central, with headquarters at West Detroit, Mich., died on October 1.

Wade H. Askew, assistant to the vice-president, traffic, of the Gulf, Mobile & Northern, with headquarters at Mobile, Ala., died at Laurel, Miss., on October 5, as the result of injuries received in an automobile accident.

George H. Langton, general master mechanic of the Chesapeake & Ohio, eastern general division, with headquarters at Clifton Forge, Va., died on September 12. Mr. Langton was born on April 13, 1872, at Hannibal, Mo. After serving an apprenticeship as machinist on the Chicago, Burlington & Quincy, he worked as machinist, roundhouse foreman, general foreman and engineer on various roads, and later served as master mechanic on the Sierra Railway of California, the Kansas City Southern, and the Texas & Pacific. He was at one time superintendent of shops and master mechanic on the Seaboard Air Line, and also held the same positions on the Virginian. Mr. Langton came to the Chesapeake & Ohio early in 1923, as mechanical inspector, and was appointed general master mechanic on February 1, 1924, which position he held until his death.

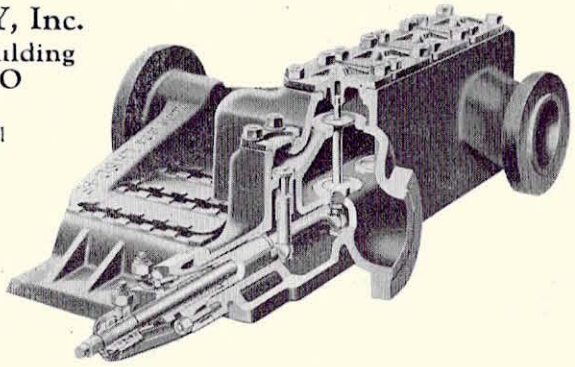
"You will find it on the largest power



YET, you'll find it on switchers, too"

Performance is the criterion by which locomotives are judged—there is no better. The same standard applied in judging locomotive throttles leads inevitably to the American multiple throttle. Here is a throttle which incorporates in its design, features which determine good throttle performance. Briefly they are—light weight—ease of application—ease of operation—immediate response—accessibility—freedom from repairs.

AMERICAN THROTTLE COMPANY, Inc.
60 East 42nd Street NEW YORK
Peoples Gas Building CHICAGO
Canadian Representative:
The Superheater Company, Limited, Montreal
A-548



American Multiple Throttle Combined with Superheater Header, for Either Type "A" or Type "E" Superheater,

DEPENDABILITY HAS A CASH VALUE!

To SAFEGUARD safety and performance, many of the accessories on the modern locomotive are in duplicate.

The stoker, however, stands alone. Under all conditions of operation it must be absolutely dependable.

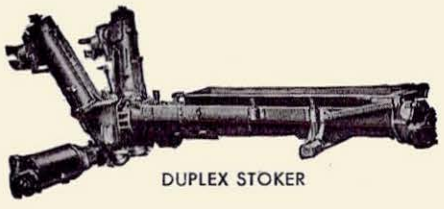
This dependability of Standard Stoker performance is assured through careful, experienced design, proper materials, correct assembly and exhaustive tests.

The result is service records averaging more than 700,000 miles without a failure due to stoker performance.

Such dependability of performance has a real cash value to the railroads.

TYPE "B" STOKER

TYPE "B-K" STOKER

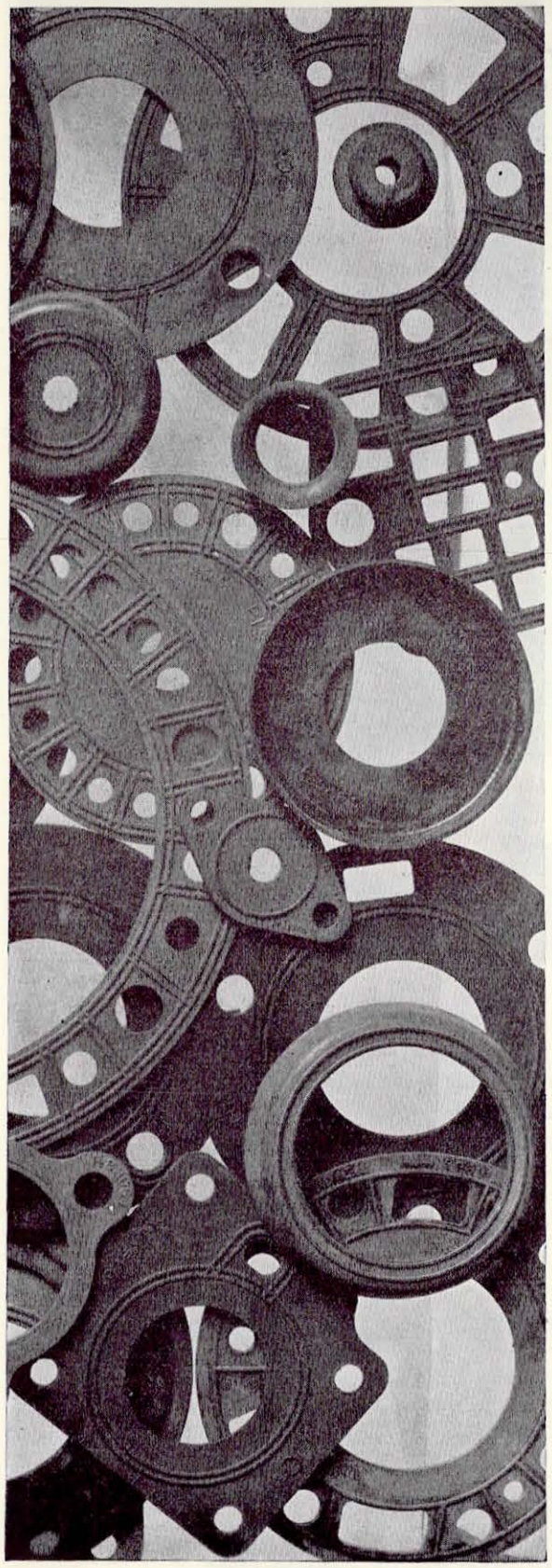


DUPLEX STOKER

THE STANDARD STOKER COMPANY, Inc.

NEW YORK CHICAGO ERIE

WABCO



To Make and Hold an Air Tight Seal

IN gasket manufacture, the moulding of a sealing bead that will make and hold an air-tight joint is by no means an easy matter. It has taken many years of research in the design and construction of moulds to perfect those which now produce the perfect beads you find on Wabco Gaskets.

These beads *make* an air-tight joint and *hold* it air-tight during the entire life of the Wabco compound. This compound, as all users know, lives for an unusually long period. It has been specially blended to resist the oil, the heat, and the wear, or any combination of these various destructive factors met with under various conditions.

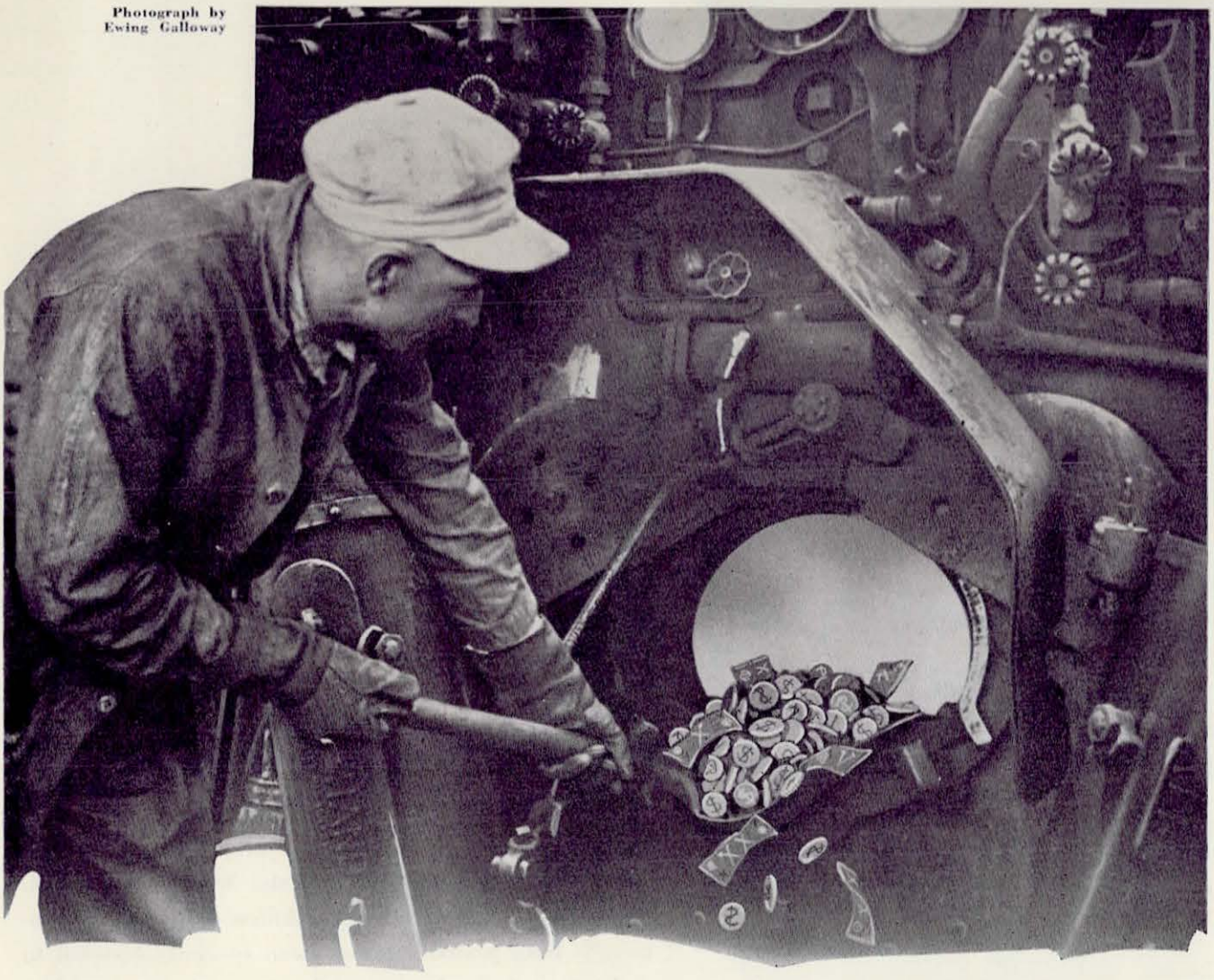
The bead, in other words, is not only accurately moulded but is long preserved by the use of compounds which are calculated to withstand particular conditions. When you apply a Wabco Gasket, therefore, you not only make the tightest seal to start with but insure against the possibility of leakage for the longest period of time.

WESTINGHOUSE AIR BRAKE CO.

GENERAL OFFICE AND WORKS

WILMERDING, PA.

Photograph by Ewing Galloway



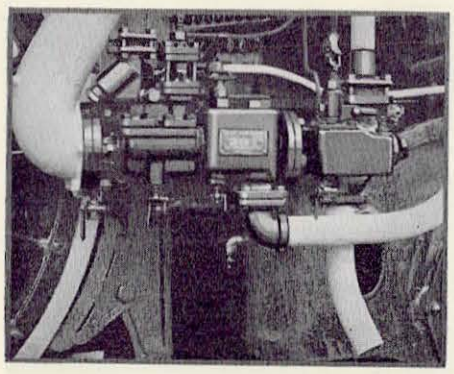
Fuel is Money

Every shovelful of coal consumed by a locomotive is in effect *real money*.

Some of that money can be retained by using part of the heat in the exhaust steam to preheat the boiler feed water on its way from the tank to the boiler.

The Elesco exhaust steam injector-heater, operating on exhaust steam, is an ideal medium for accomplishing this economy. It is a simple, easily operated and reliable method of saving 8 to 12 per cent of the fuel that otherwise would be burned.

Elesco exhaust steam injector-heaters are suited to all locomotives that you wish to keep in service. Apply them now.



Compact and Easy to Apply

THE SUPERHEATER COMPANY

60 East 42nd Street
NEW YORK

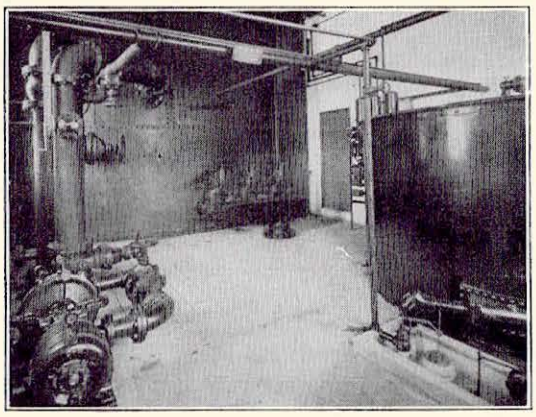
ELESCO

Peoples Gas Building
CHICAGO

Canada: The Superheater Company, Limited, Montreal

SUPERHEATERS FEED WATER HEATERS EXHAUST STEAM INJECTORS
SUPERHEATED STEAM PYROMETERS

A-642



HIGHER PRESSURES DEMAND BETTER FEED WATER

Raw water is taboo in high pressure locomotives for its consequences more than off-set the advantages of higher operating pressures.

There is a certainty of correct water conditioning if Graver Railroad Water softeners stand guard over your feedwater supply. And Graver engineers can approximate very closely your economy in dollars and cents over present methods. Ask for an estimate.

●

Graver is the largest designer and manufacturer of a complete line of Water Treating Equipment

GRAVER TANK & MFG. CORP.
East Chicago, Indiana

Manufacturers of

GRAVER WATER TREATING EQUIPMENT

also

Special and Standard Tanks—Special Steel Plate Construction

●

New Developments in Telephone Train Dispatching

*2 *Compact* Jack Box

Many advantageous features will be found in the new Western Electric 60-A Jack Box, developed by the Bell Telephone Laboratories to provide improved way-station telephone facilities for train dispatching.

The compactness of the 60-A Jack Box is especially interesting. A single compact unit, this Jack Box has a terminal capacity of ten telephone lines and includes from one to ten combined jacks and signals with wiring, one annunciator buzzer, one key, a solid plug, and an easily accessible terminal plate. All this (excepting plug) is contained in a small metal cabinet 10 inches long, 7½ inches high, and 7½ inches deep.

The compact, rugged, construction of the apparatus simplifies maintenance. All connections are easily accessible on a terminal plate in the top of the box. All other parts may be reached by removing the rear panel.

Operation is simple. Drop signals indicate incoming calls, but the buzzer may be used in addition, if desired. Insertion of the plug into the jack indicated by the fallen shutter puts the operator's telephone set into circuit. At the same time, this operation automatically restores the shutter to its normal position.

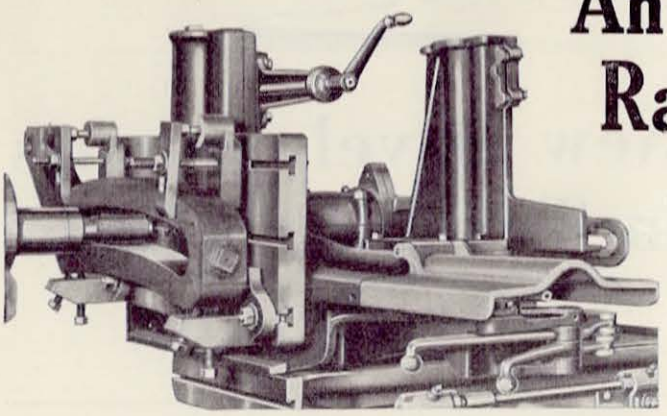
The high quality of this apparatus is typical of the high standards of quality associated for years with the name Western Electric . . . For further information on the Western Electric Train Dispatching equipment, write the distributor, the Graybar Electric Company.

GraybaR

OFFICES IN 76 PRINCIPAL CITIES
EXECUTIVE OFFICES:
GRAYBAR BLDG., N. Y.

**Note: This is one of a series of advertisements dealing with the latest developments in telephone train dispatching. Watch for subsequent advertisements. Or, better yet, send your name to be put on the mailing list for the series.*

An Important Factor in Railway Shop Economy

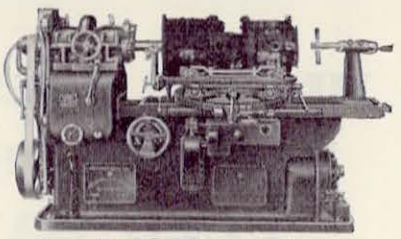


Micro link grinding attachment with Walschaert link mounted

A Micro Grinder does no loafing on the job. Versatility—the ability to do a large variety of work—keeps the wheels of a Micro turning every hour of the day.

Railroad shops, both large and small, find that the Micro Internal Grinders fit perfectly into modern methods of production.

Handy work holding fixtures enable the operator to change from one type of work to another in a surprisingly short space of time. If you are not already familiar with Micro efficiency and economy standards, we urge you to witness a Micro in operation. We shall be glad to direct you to a nearby installation. Write for Micro Catalog.



Micro Model FG with air pump mounted

Grind These Parts on a MICRO

Side and Main Rods, Valve Motion Parts, Booster Engine Cylinders, Feed Water Pump Cylinders, Steam Chest Bushings, Throttle Valve Chambers, Link Radii, Bell Ringer Cylinders, Fire Door Cylinders, Shop Mule Engine Cylinders, Steam Heat Regulators, Stoker Engine Cylinders, Water Scoop Air Cylinders, Grate Shaker Cylinders, Etc.

MICRO MACHINE COMPANY

Bettendorf — MANUFACTURERS AND DESIGNERS OF *PRECISION GRINDERS* FOR ALL PURPOSES — Iowa, U-S-A

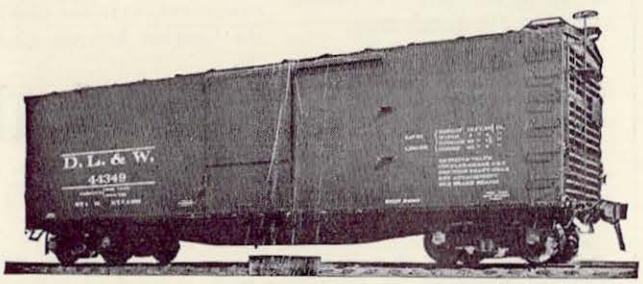
CAMEL & **YOUNGSTOWN**

Freight Car Door Fixtures

Corrugated Steel Freight Car Doors

CAMEL SALES COMPANY 332 South Michigan Avenue CHICAGO, ILLINOIS

MT. VERNON CAR MFG. CO. MT. VERNON, ILL.



40 Ton Box Car

Builders of All Kinds of Freight Cars

Annual Capacity { 12,000 Freight Cars; 125,000 { Chilled Tread Wheels; 20,000 Tons Forgings

Individual Shop and Special Facilities for Rebuilding and Repairing Cars

A.R.A. Standard "D" Couplers

Pitt Couplers
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for Cars and Locomotives

Pitt Pivoted and "D" Couplers

designed especially for
Passenger Train Cars

The McConway & Torley Company

48th St. & A. V. Ry., Arsenal Station
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MAGNUS COMPANY

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Journal Bearings

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PANTASOTE

The National Standard for Car Curtains and Seats

Since 1897 this remarkable material has been lowering the cost of maintenance by added years of wear.

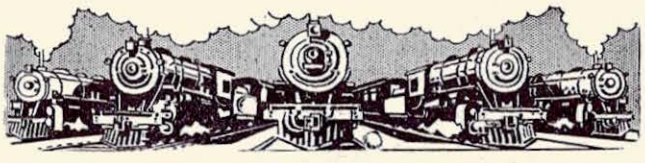
AGASOTE HEADLININGS

The only headlining made in one piece and which possesses the desirable qualities of wood and steel without their defects. Will not separate, warp or blister and is completely waterproof.

The PANTASOTE CO. Inc.

250 Park Ave., New York

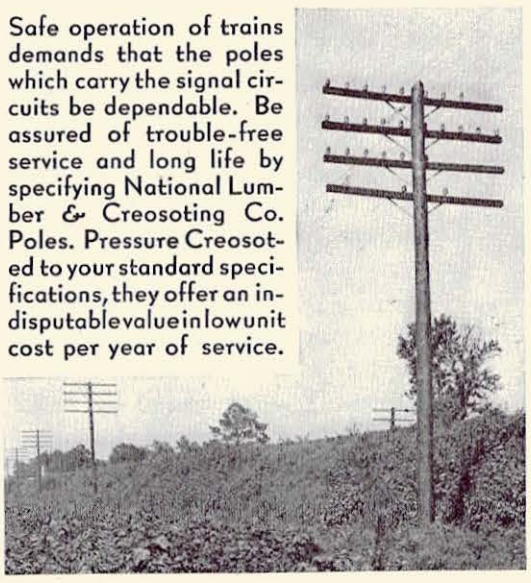
Peoples Gas Bldg. DETROIT CHICAGO SAN FRANCISCO



P O L E S

FOR RAILWAY SERVICE

Safe operation of trains demands that the poles which carry the signal circuits be dependable. Be assured of trouble-free service and long life by specifying National Lumber & Creosoting Co. Poles. Pressure Creosoted to your standard specifications, they offer an indisputable value in low unit cost per year of service.



National Lumber & Creosoting Company

GENERAL OFFICES: TEXARKANA, ARK.-TEX

SALES OFFICES
Texarkana, Ark. Houston, Tex.
Kansas City, Missouri
St. Louis, Mo. Denver, Colo. Superior, Wis.

TREATING PLANTS
Texarkana, Tex. Houston, Tex. Alexandria, La.
Pitney (P. O. Col. Park, O) Kansas City, Mo.
Salida, Colo. Denver, Colo. Superior, Wis.

MORE TONNAGE

More tonnage hauled per locomotive is but one of the advantages of preventing foaming with "B-A Anti-Foam."

Terminal delays are reduced, train movement is speeded up; fuel and water consumption costs are cut and lubrication is improved.

Bird-Archer water treatment engineers and laboratories are always at your service.

THE BIRD-ARCHER COMPANY

New York — Chicago — Philadelphia

THE BIRD-ARCHER COMPANY, LIMITED, MONTREAL

Laboratories and Plants at Philadelphia, Chicago and Cobourg, Ont.

KERITE
AN INVESTMENT
When you put your money into KERITE you make an investment in service. You do more than buy conductors, insulation and protection. You obtain the best possible combination of the most desirable qualities in permanent form. KERITE remains long after the price is forgotten.
THE KERITE INSULATED WIRE & CABLE COMPANY INC
NEW YORK CHICAGO SAN FRANCISCO

THREE *FACTS* ABOUT CORO-NOLEUM

1. It Cleans and Disinfects in one operation, eliminating soap.
2. Less is required for a satisfactory solution because it is so highly concentrated.
3. It is guaranteed to be 5 to 6 times as powerful bacteriologically as Carbolic Acid (Phenol) when tested by the Hygienic Laboratory Phenol Coefficient Method of the U. S. Public Health Service.

All these mean Economy and Efficiency

WEST DISINFECTING CO.

RAILROAD DEPARTMENT

RAILWAY EXCHANGE BLDG. CHICAGO, ILL.

BARBER LATERAL-MOTION DEVICE

1,300,000 cars in service on over 60 Railroads and Car Lines

ROLLER SIDE-BEARINGS

Reduces Friction on Rails 15%
Lessens Wheel Flange Wear

STANDARD CAR TRUCK CO.

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OHIO LOCOMOTIVE CRANES

ERECTION CRANES - LOGGING CRANES
WHARF, BARGE AND GANTRY CRANES
RAILROAD PILE DRIVERS
CRAWLER CRANES & SHOVELS

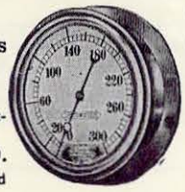
THE OHIO LOCOMOTIVE CRANE CO.
BUCYRUS, OHIO

New Journal Box Lid requirements per A.R.A. circular No. A-337-1930 are complied with in ASCO A. R. A. Special Torsion Spring Journal Box Lids.

Allegheny

BUFFALO BRAKE BEAM CO.
—BRAKE BEAMS—
AUXILIARY SUPPORTS FOR BRAKE BEAMS
NEW YORK AND BUFFALO

Ashton High Grade
Pop Valves—Steam Gauges
the quality standard for over 50 years.
Exclusive features insuring greatest efficiency and durability.
THE ASHTON VALVE CO.
New York, Boston, Chicago and San Francisco

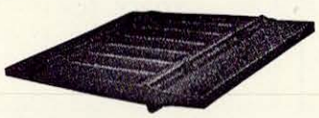


Hollow Iron Bars up to 14 ft. long—Solid to 16 ft. Hollow or solid Stays, plain, headed, or headed and threaded.

EDGEWATER STEEL COMPANY
PITTSBURGH, PA.
Details of our products appear in the following issues of Railway Age during 1931:
May 16—June 13—July 4—Aug. 1, 8, 15, 22, 29—Sept. 5, 12.

Nichols Transfer Tables
Turntable Tractors
Geo. P. Nichols & Bro. Chicago
2139 Fulton Street

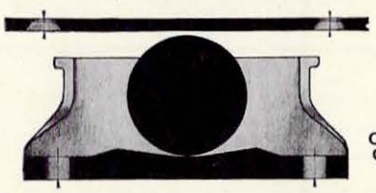
PAKRING METAL
THE STRONG, LONG LIVED WEARING METAL
LOCOMOTIVE CYLINDERS AND CYLINDER PARTS FINISHED AND ROUGH
The John Seaton Foundry Co.
The Locomotive Finished Material Co.
ATCHISON, KANSAS



TIE PLATES
Track Appliances
Highway Crossing Signals
Signal Accessories
THE RAILROAD SUPPLY COMPANY
CHICAGO NEW YORK

UNION STEEL CASTING COMPANY PITTSBURGH, PA.
Cast Steel Locomotive Cylinders, Carbon and Vanadium Cast Steel Locomotive Frames, Wheel Centers, Crossheads and General Miscellaneous Castings for Locomotive and Car Work.

A QUALITY PRODUCT
RESULT OF 40 YEARS EXPERIENCE
TUCOLITH
FLEXOLITH
CAR FLOORING
TUCO PRODUCTS CORP.
30 CHURCH STREET, NEW YORK
122 S. MICHIGAN AVE., CHICAGO



STUCKI SIDE BEARINGS
Manufactured by
A. Stucki Co.
Oliver Bldg., Pittsburgh Pa.
Canadian Representative:
The Holden Co. Ltd.,
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Union Spring & Manufacturing Co.
Steel Castings, Coil Springs, Spring Plates
Elliptic Springs, Journal Box Lids
Kensington (All Steel) Journal Box
WORKS: New Kensington, Pa.
PITTSBURGH OFFICE: 2001 Clark Building

The Get Together Department on page 40 is maintained for those who have used equipment to sell.

THE "FAIR"
RAIL ANTI-CREEPER
THE P & M CO.
CHICAGO NEW YORK
Montreal London Paris Calcutta Sydney

UNARCO
Asbestos and Rubber Packings for Railroad Use. Asbestos Insulating Materials
UNION ASBESTOS & RUBBER CO.
310 South Michigan Ave. Chicago, Ill.

Our tests determine the best type of shoe for each type of service
The American Brake Shoe & Foundry Co.
230 Park Ave., New York 332 So. Michigan Ave., Chicago

Western
DUMP CARS
Are Quick
Operating
WESTERN WHEELED SCRAPER CO.
Builders of Air Dump Cars
AURORA, ILLINOIS

WINE RAILWAY APPLIANCE CO.
TOLEDO, OHIO
Details of our products appear in following issues of Railway Age during 1931
January 3—February 7—March 7—April 4—May 2—June 6—July 4—August 1—or Railway Mechanical Engineer.

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BATTEY & KIPP
INCORPORATED
Engineers
Complete Railroad Shops and Locomotive Terminals
Power Plants
Industrial Properties
231 So. La Salle St., Chicago

Robert W. Hunt Company
ENGINEERS
Inspection—Tests—Consultation
All Railway Equipment, Structures and Materials
General Office:
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CHICAGO
Offices in all principal cities

JOHN E. MUHLFELD
TRANSPORTATION ENGINEERING
25 Broad Street, New York

Place Your Card Here

Gulick-Henderson Company
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Pittsburgh Testing Laboratory
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Analysis . . Inspection . . Testing . . Research
Branch Offices in the Principal Cities

Second Hand Equipment — Get Together Department — Factory and Railroad Equipment

POSITION OPEN

IF you are open to overtures for new connection, and qualified for a salary between $2,500 and $25,000, your response to this announcement is invited. The undersigned provides a thoroughly organized service of recognized standing and reputation, through which preliminaries are negotiated confidentially for positions of the calibre indicated. The procedure is individualized to each client's personal requirements; your identity covered and present position protected. Established twenty-one years. Send only name and address for details. R. W. Bixby, Inc., 102 Downtown Building, Buffalo, New York.

POSITION WANTED

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Milwaukee Electric Crane & Hoist Corp.

Cranes, Handpower.
Industrial Brownhoist Corp.
Shephard-Niles Crane & Hoist Corp.

Cranes, Jib.
Industrial Brownhoist Corp
Milwaukee Electric Crane & Hoist Corp.
Worthington Pump & Machinery Corp.

Cranes, Locomotive.
Industrial Brownhoist Corp
Ohio Locomotive Crane Co
Orton Crane & Shovel Co.

Cranes, Overhead.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Shephard-Niles Crane & Hoist Corp.

Cranes, Pillar.
Industrial Brownhoist Corp
Milwaukee Electric Crane & Hoist Corp.

Cranes, Portable.
Orton Crane & Shovel Co.

Cranes, Transfer.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Traveling.
Milwaukee Electric Crane & Hoist Corp.
Shephard-Niles Crane & Hoist Corp.

Cranes, Wharf.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Wrecking.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Crank Pins — (See Pins, Crank).

Creosote.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
International Creosoting & Constr. Co.
National Lumber & Creosoting Co.

Creosote, Wood Preservative Treatment.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
National Lumber & Creosoting Co.

Cribbing Units.
Federal American Cement Tile Co.

Cross Arms, Treated.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
Graybar Electric Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Cross Ties, Treated.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Cross Ties, Steel.
Bethlehem Steel Co.

Crossheads & Shoes.
Baldwin Locomotive Wks.
Barco Mfg. Co.
International Creosoting & Construction Co.

Crossing Signals & Signs.
Railroad Supply Co.

Crossings—(See Frogs and Crossings).

Crossings, Pavement.
Carey Co., The Philip.

Crushers, Coal.
American Sheet & Tin Plate Co.
Orton Crane & Shovel Co.

Culverts.
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.
Toncan Culvert Manufacturers' Association.

Culverts, Corrugated Iron
Armco Culvert Manufacturers' Association.
Republic Steel Corp.

Culverts, Part Circle
Armco Culvert Manufacturers Association

Culverts, Treated.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Cups, Oil.
New York Air Brake Co.
Prime Manufacturing Co., The.
Westinghouse Air Brake Co.

Curtain Material, Car.
Ryerson & Son, Jos. T.

Curtains, Cab.
Lehon Co., The
Pantasote Co., The.

Curtains & Fixtures, Car.
Pantasote Co., The

Cutting and Welding Apparatus.
Electric Railweld Service Corp.
Oxweld Railroad Service Co.
Westinghouse Electric & Mfg. Co.

Cut-Off Indicators and Recorders.

Cylinder Parts, Finished and Rough.
Locomotive Finished Material Co.
National Tube Co.
Valve Pilot Co.

Cylinders, Air Brake.
Westinghouse Air Brake Co.

Cylinders, Cast Steel Locomotive.
General Steel Castings Corp.

Cylinders, Locomotive
Locomotive Finished Material Co.
Union Steel Casting Co.

Deoxidizers.
Q & C Co., The.
Vanadium Corp. of America.

Derricks.
Industrial Brownhoist Corp.

Diesel Electric Power Plants.
Fairbanks-Morse & Co.
Westinghouse Elec. & Mfg. Co.

Dirt Collectors.
New York Air Brake Co.
Westinghouse Air Brake Co.

Disinfectants.
West Disinfecting Co.

Dispatching Systems.
General Railway Signal Co.
Union Switch & Signal Co.

Ditching Machinery.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Door Fixtures — (See Fixtures, Car Door).

Doors, Car.
Camel Sales Co.
Chicago Railway Equipment Co.
Miner, W. H.
Wine Railway Appliance Co.

Doors, Locomotive Firebox.
Franklin Railway Supply Co., Inc.

Doors, Rolling, Steel.
Kinnear Mfg. Co.

Draft Arms.
American Steel Foundries.
Birdsboro Steel Foundry & Machine Co.
Bradford Corporation.
Symington Co., The.
Universal Draft Gear Attachment Co.

Draft Gear Attachments.
Symington Co., The

Draft Gears.
American Steel Foundries.
Bradford Corporation.
Cardwell-Westinghouse Co.
Edgewater Steel Co.
Fort Pitt Malleable Iron Co.
Miner, W. H.
National Malleable & Steel Castings Co.
Standard Coupler Co.
Union Draft Gear Co.
Universal Draft Gear Attachment Co.

Draft Yokes.
American Steel Foundries.
Bettendorf Co., The.
Buckeye Steel Castings Co.
Gould Coupler Co., The.
McConway & Torley Co.
Miner, W. H.
Mt. Vernon Car Mfg. Co.
National Malleable & Steel Castings Co.
Pressed Steel Car Co.
Steel Car Forge Co.
Symington Co. The.
Universal Draft Gear Attachment Co.

Drainage Gates, Automatic
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.

Drains, Perforated Iron.
Republic Steel Corp.

Drawbar Centering Device.
Gould Coupler Co., The.
Miner, W. H.

Drawbars, Unit Safety.
Franklin Railway Supply Co., Inc.
Industrial Brownhoist Corp.

Dredging Machinery.
Industrial Brownhoist Corp.

Drilling Machines.
Sellers & Co., Inc., Wm.

Drilling Machines, Bonding.
Railroad Supply Co.

Drilling Machines, Pneumatic
Ingersoll-Rand Co.

Drilling Machines, Rock.
General Electric Co.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Drilling Machines, Upright and Radial.
Ryerson & Son, Joseph T.
Sellers & Co., Inc., Wm.

Drills.
Ingersoll-Rand Co.

Drills, Close Corner.
Ingersoll-Rand Co.

Drills, Concrete.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Drills, Steel Rock and Steel Sharpened.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Drills, Track & Bending.
Bird-Archer Co., The.
Ingersoll-Rand Co.

Drive Gas Electric Coaches.
General Electric Co.

Drive Gas Electric Locomotives
Westinghouse Electric & Mfg. Co.

Driving Boxes (Extended Main).
Franklin Railway Supply Co., Inc.

Drop Door Mechanism.
Wine Railway Appliance Co.

Dynamos—(See Generators, Electric).

Electrical Cable Accessories.
General Electric Supply Corp.

Electric Cables.
American Steel & Wire Co.
Anaconda Wire & Cable Co
General Electric Supply Corp.

Electrical Instruments.
Electric Service Supplies Co.
Railroad Supply Co.
Westinghouse Elec. & Mfg. Co.

Electrical Supplies.
General Electric Co.
General Electric Supply Corp.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Electrification. Railroad.
Battey & Kipp.
General Electric Co.
United Engineers & Constructors, Inc.
Westinghouse Elec. & Mfg. Co.

Electric Heaters.
General Electric Supply Corp.

Electrical Insulation.
General Cable Corp.
General Electric Supply Corp.

Electrical Porcelain Insulators.
General Electric Supply Corp.

Electric Motors.
General Electric Supply Corp.

Electric Rivet Heaters.
General Electric Supply Corp.

Electric Switches.
General Electric Supply Corp.

Enamels.
Lowe Bros. Co., The.
Sherwin-Williams Co.

End Frames, Cast Steel, Passenger Car.
General Steel Castings Corp.

Ends, Steel.
Hutchins Car Rfg. Co.
Union Metal Products Co.

Engineers, Consulting, Civil, Elec., Hydraulic, Mechanical.
Battey & Kipp.
Hunt Co., Robt. W.
Muhlfeld, John E.
United Engineers & Constructors, Inc.

Engineers, Contracting.
Battey & Kipp.
United Engineers & Constructors, Inc.

Engineers and Contractors.
Battey & Kipp.
Hunt Co., Robert W.
Muhlfeld, John E.
United Engineers & Constructors, Inc.

Engineers, Construction.
Battey & Kipp.
Roberts & Schaefer Co.
United Engineers & Constructors, Inc.

Engineers and Contractors, Elec., Hydraulic, Mech.
Battey & Kipp.
Hunt Co., Robert W.
Muhlfeld, John E.
Roberts & Schaefer Co.

Engineers, Inspecting.
Gulick-Henderson Co.
Hunt Co., Robert W.
Muhlfeld, John E.
Pittsburgh Testing Laboratory.
United Engineers & Constructors, Inc.

Engineers, Valuation.
Hunt Co., Robert W.
United Engineers & Constructors, Inc.

Engines, Crude & Fuel Oil.
Fairbanks-Morse & Co.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Engines, Diesel.
Worthington Pump & Machinery Corp.

Engines, Gas.
Brill Co., The J. G.
Worthington Pump & Machinery Corp.

Engines, Gas & Gasoline.
American Car & Foundry Motors Co.
Fairbanks-Morse & Co.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Engines, Hoisting.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Excavators.
Industrial Brownhoist Corp.

Exhaust & Heater Pipe.
Union Asbestos & Rubber Co.

Exhaust & Ventilating Fans.
General Electric Supply Corp.

Expanders, Tube.
Ryerson & Son, Joseph T.

Fans, Exhaust & Ventilating.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Fasteners, Car Door.
Camel Sales Co.
Fort Pitt Malleable Iron Co.
Miner, W. H.
National Malleable & Steel Castings Co.

Feed Water Heater Systems.
Bird-Archer Co., The.
Worthington Pump & Machinery Corp.

Fencing Wire—(See Wire, Fence).

Fence Posts, Treated.
American Steel & Wire Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Ferro Alloys.
Vanadium Corp. of America.

Ferro, Chromium.
Vanadium Corp. of America.

Ferro, Molybdenum.
Vanadium Corp. of America.

Ferro, Silicon.
Vanadium Corp. of America.

Ferro, Tungsten.
Vanadium Corp. of America.

Ferro, Vanadium.
Vanadium Corp. of America.

Filters, Air.
New York Air Brake Co.
Westinghouse Air Brake Co.

Filters, Water & Industrial.
Graver Tank & Mfg. Corp.

Filtration Plants (Water).
Graver Tank & Mfg. Corp.

Fireboxes.
American Locomotive Co.
Baldwin Locomotive Works.

Fire Fighting & Protection Equipment.
Johns-Manville Corp.

Fittings, Air Brakes.
Westinghouse Air Brake Co.

Fittings, Steam.
Vapor Car Heating Co., Inc.

Fixtures, Car Door.
Camel Sales Co.
Chicago Railway Equipment Co.
Miner, W. H.
National Malleable & Steel Castings Co.

Flangers, Snow.
Q & C Co., The.

Floodlights.
General Electric Supply Corp.
Graybar Electric Co.
Oxweld Railroad Service Co.
Pyle-National Co.
Symington Co., The.
Westinghouse Elec. & Mfg Co.

Floodlights, Acetylene.
Oxweld Railroad Service Co., The.

Flooring.
Carey & Co., Philip, The.
Johns-Manville Corp.

Flooring, Car.
Tuco Products Corp.

Flooring, Coach.
Tuco Products Corp.

Flooring, Composition.
Johns-Manville Corp.
Tuco Products Corp.

Flooring, Treated.
Central Coal & Coke Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
National Lumber & Creosoting Co.

Floor Plates, Steel.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Company

Floor Slabs, Concrete.
American Cement Tile Mfg. Co.

Flue Cleaners—(See Cleaners, Flue).

Flue Cutters—(See Cutters, Flue).

Flues, Boiler—(See Tubes, Boiler).

Flue Shop Equipment.
Ryerson & Son, Joseph T.

Forges, Rivet Heating.
Ryerson & Son, Joseph T.

Forging Hammers.
Industrial Brownhoist Corp.

Forgings.
American Bridge Co.
American Steel Foundries.
Baldwin Locomotive Works. The.
Bethlehem Steel Co.

Brill Co., The J. G.
Carnegie Steel Co.
Edgewater Steel Co.
General Railway Signal Co.
Gould Coupler Co., The.
Illinois Steel Co.
Midvale Co., The.
Mt. Vernon Car Mfg. Co.
Neely Nut & Bolt Co.
Pressed Steel Car Co.
Standard Steel Works Co.
Steel Car Forge Co.
Universal Draft Gear Attachment Co.

Forgings, Drop.
Baldwin Locomotive Works, The.
Brill Co., The J. G.
General Railway Signal Co.
Steel Car Forge Co.
Union Switch & Signal Co.

Forgings, Monel Metal.
International Nickel Co., The.

Foundry Supplies.
Bird-Archer Co., The.

Frames, Cast Steel Locomotive
General Steel Castings Corp.

Frames, Locomotive.
American Steel Foundries.
American Locomotive Co.
Baldwin Locomotive Works.
Birdsboro Steel Foundry & Machine Co.
Ohio Steel Foundry Co., The.
Union Steel Casting Co.

Frames, Truck.
American Locomotive Co.
American Steel Foundries.
Baldwin Locomotive Works.
Bettendorf Co., The.
Birdsboro Steel Foundry & Machine Co.
Buckeye Steel Castings Co.
Brill Co., The J. G.
Franklin Railway Supply Co., Inc.
Gould Coupler Co., The.
Ohio Steel Foundry Co., The.
Pressed Steel Car Co.
Pyle-National Co.
Symington Co., The.

Frames, Vanadium.
American Locomotive Co.
Baldwin Locomotive Works.
Birdsboro Steel Foundry & Machine Co.
Union Steel Casting Co.

Frogs and Crossings.
Bethlehem Steel Co.
Ramapo Ajax Corp.

Fulcrums, Brake Beam.
American Steel Foundries.
Brill Co., The J. G.
Buffalo Brake Beam Co.
Chicago Railway Equipment Co.
National Malleable & Steel Castings Co.

Furnaces, Electric.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Furnaces, Gasoline.
Railroad Supply Co.

Furnaces, Rivet Heating—(See Forges, Rivet Heating).

Furniture.
Aluminum Co. of America

Gage Testers—(See Testers, Gage).

Gages, Air.
Westinghouse Air Brake Co.

Gages, Oxy-Acetylene.
Oxweld Railroad Service Co., The.

Gages, Steam.
Ashton Valve Co.

Gages, Tire.
Schrader's Son, Inc., A.

Gages, Wheel Press Recording.
Ashton Valve Co.

Gaskets.
Westinghouse Air Brake Co.

Gasoline.
Ethyl Gasoline Corp.

Gear Blanks, Rolled Steel.
Edgewater Steel Co.
Standard Steel Works Co.

Gears and Pinions.
American Steel Foundries.
Westinghouse Elec. & Mfg. Co.

Gears, Silent.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Gears, Valve — (See Valve Gears).

Generators, Acetylene.
Oxweld Railroad Service Co.

Generators, Electric.
Fairbanks-Morse & Co.
General Electric Co.
Graybar Electric Co.
Sunbeam Electric Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Goggles, Welding.
Oxweld Railroad Service Co., The.
Sunbeam Electric Mfg. Co.

Graders, Elevating.
Western Wheeled Scraper Co.

Grapples, Wood.
Industrial Brownhoist Corp.

Grate Bars.
Q & C Co., The.

Grate Shakers, Automatic.
Franklin Railway Supply Co., Inc.

Grates.
Firebar Corp.

Grease Forming Machines.
Franklin Railway Supply Co., Inc.

Grey Iron.
American Brake Shoe & Foundry Co.

Grinders, Internal.
Micro Machine Co.

Grinders, Portable Crank Pin.
Micro Machine Co.

Grinding Machines.
Sellers & Co., Inc., Wm.

Grinding Machines, Portable.
Ingersoll-Rand Co.
Ryerson & Son, Inc., Joseph T.

Guard Rails, Treated.
Curtin-Howe Corp.
International Creosoting & Construction Co.

Guard Rails, Foot Guard.
Q & C Co., The.

Guard Rails (One Piece).
Bethlehem Steel Co.
Ramapo Ajax Corp.

Guard Switch Point.
Q & C Co., The.

Guards, Cattle.
American Bridge Co.

Guards, Dust.
Gould Coupler Co., The.
Symington Co., The.

Hair Felt.
Johns-Manville Corp.

Hammers, Pneumatic.
Ingersoll-Rand Co.

Hammers, Riveting.
Ingersoll-Rand Co.

Hammers, Steam.
Industrial Brownhoist Corp.
Sellers & Co., Inc., Wm.

Hand Brakes—(See Brakes, Hand).

Hangers, Ball Bearing.
S. K. F. Industries, Inc.

Hand Rails & Fittings.
Aluminum Co. of America.

Hangers, Bottom Rod Safety
Chicago Railway Equipment Co.

Hangers, Car Door—(See Fixtures, Car Door).

Headgates, Sliding
Armco Culvert Manufacturers Association

Headlight Repair Parts, Electric.
Electric Service Supplies Co.
Pyle-National Co.
Sunbeam Electric Mfg. Co.

Headlights, Electric.
General Electric Co.
Pyle-National Co., The.
Sunbeam Electric Mfg. Co.
Westinghouse Electric & Mfg. Co.

Headlights, Reflectors & Cases.
Pyle-National Co.
Sunbeam Electric Mfg. Co.

Headlining.
Pantasote Co., The

Heaters, Electric.
Gold Car Heating & Lighting Co.
Westinghouse Electric & Mfg. Co.

Heaters, Feedwater.
Graver Tank & Mfg. Corp.

Heaters, Feedwater Locomotive.
Coffin Co., Jr., The J. S.
Superheater Company, The.
Worthington Pump & Machinery Corp.

Heaters, Feed Water, Stationary.
Brill Co., The J. G.
Worthington Pump & Machinery Corp.

Heating & Ventilating Apparatus.
Gold Car Heating & Lighting Co.
Vapor Car Heating Co., Inc.
Westinghouse Electric & Mfg. Co.

Heating Equipment, Car.
Gold Car Heating & Lighting Co.
Vapor Car Heating Co., Inc.
Wine Railway Appliance Co.

Heating Systems, Car (Electric and Steam).
Gold Car Heating & Lighting Co.
Vapor Car Heating Co., Inc.
Wine Railway Appliance Co.

High Temperature Cements.
Carey & Co., Philip, The.

Highway Crossing Protection Devices.
American Bridge Co.
Franklin Railway Supply Co., Inc.
Griswold Signal Co.
Railroad Supply Co.

Hoists, Chain.
Milwaukee Electric Crane & Hoist Corp.
Ryerson & Son, Jos. T.

Hoists, Electric.
Milwaukee Electric Crane & Hoist Corp.

Hoists, Pneumatic.
Ingersoll-Rand Co.

Hoisting Machinery.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Orton Crane & Shovel Co.

Hooks, Wrecking.
National Malleable & Steel Castings Co.

Horns, Pneuphonic.
Westinghouse Air Brake Co.

Hose, Air, Steam, Etc.
Ingersoll-Rand Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Hose, Oxy-Acetylene.
Oxweld Railroad Service Co., The.

Hose, Tender.
Westinghouse Air Brake Co.

Incandescent Lamps.
General Electric Supply Corp.

Indicators, Speed & Cut-off.
Valve Pilot Co.

Ingots.
Birdsboro Steel Foundry & Machine Co.
Carnegie Steel Co.
Edgewater Steel Co.
Illinois Steel Co.
McConway & Torley Co.
Standard Steel Works Co.

Injectors, Exhaust Steam.
Sellers & Co., Inc., Wm.
Superheater Co., The.

Inspection of Material and Equipment—(See Engineers, Inspection).

Insulated Wire.
American Steel & Wire Co.
Anaconda Wire & Cable Co.
General Electric Supply Corp.

Insulation, Car.
Carey Co., Philip, The.
Wood Conversion Co.

Insulation, Car, Bldg.
Carey Co., Philip, The.
JohnsManville Corp.
Lehon Co., The.
Tuco Products Corp.
Union Asbestos & Rubber Co.
Wood Conversion Co.

Insulation, Electrical.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Insulation, Exhaust & Heater Pipe.
Carey Co., Philip, The.
Johns-Manville Corp.
Tuco Products Corp.
Union Asbestos & Rubber Co.

Insulation, Heat.
Carey Co., Philip, The.
Miner, W. H.

Insulation Tape.
General Electric Supply Corp.

Insulators, Electrical, Porcelain.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Interlocking Plant Equipment.
General Railway Signal Co.
Union Switch & Signal Co.

Iron Chain.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
Ryerson & Son, Joseph T.

Iron, Charcoal.
Bethlehem Steel Co.
Ewald Iron Co.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
Ryerson & Son, Joseph T.

Iron, Engine Bolt.
Lockhart Iron & Steel Co.
Ryerson & Son, Joseph T.

Iron, Forging Billets.
Lockhart Iron & Steel Co.

Iron, Hollow Staybolt.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.

Iron, Hollow Staybolt Bars.
Bethlehem Steel Co.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.

Iron, Pig.
Bethlehem Steel Co.

Iron, Refined.
Ewald Iron Co.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
Reading Iron Co.
Ryerson & Son, Joseph T.

Iron, Staybolt — (See also Staybolts).
Ewald Iron Co.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
Reading Iron Co.
Ryerson & Son, Joseph T.

Jacking, Locomotive.
Carey Co., Philip, The.

Jacking Method of Installing Pipe
Armco Culvert Manufacturers Association

Jacks, Smoke.
Carey Co., Philip, The.
Johns-Manville Corp.

Joints, Air Reservoir.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Blow Off Line (Roundhouse).
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Coach and Coach Yard.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Flexible.
Franklin Railway Supply Co., Inc.
Vapor Car Heating Co. Inc.

Joints, Flexible Ball.
Barco Mfg. Co.

Joints, Rail.
American Steel Foundries.
Carnegie Steel Co.
Illinois Steel Co.
Q & C Co., The.
Rail Joint Co.
Union Switch & Signal Co.

Joints, Steam, Air & Liquid.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.
Vapor Car Heating Co., Inc.

Joints, Swing.
Barco Mfg. Co.
Vapor Car Heating Co., Inc.

Journal Boxes and Lids.
Allegheny Steel Co.
American Steel Foundries.
Brill Co., The J. G.
Gould Coupler Co., The.
Hunt-Spiller Mfg. Corp.
National Malleable & Steel Castings Co.
Pullman Car & Mfg. Corp.
Railway Steel Spring Co.
Symington Co., The.
Union Spring & Mfg. Co.

Journal Oilers, Car & Locomotive.
Ardco Mfg. Co.

Keys, Brake Shoe.
Bradford Corporation.
Buffalo Brake Beam Co.
Mt. Vernon Car Mfg. Co.
Steel Car Forge Co.
Union Spring & Mfg. Co.

Knuckles, Emergency.
Q & C Co., The.

Laboratories, Testing.
Hunt Co., Robert W.
Pittsburgh Testing Laboratory.

Lacquers.
General Electric Supply Corp.
Sherwin-Williams Co.

Ladders, Steel Car.
Wine Railway Appliance Co.

Lagging, Locomotive.
Carey & Co., Philip, The.
Johns-Manville Corp.

Lamps, Incandescent.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Inspector's.
Oxweld Railroad Service Co., The.

Lath, Metal.
Armco Railroad Sales Co.

Lathes, Axle.
Sellers & Co., Inc., Wm.

Lathes, Engine.
Ryerson & Son, Joseph T.

Lathes, Wheel.
Sellers & Co., Inc., Wm.

Lead, White.
National Lead Co.

Lighting Equipment, Car.
Electric Storage Battery Co.

Lighting Fixtures and Systems.
General Electric Supply Corp.
Graybar Electric Co.
Pyle-National Co.

Lighting Plants, Gas, Electric
Pyle-National Co., The.
Sunbeam Electric Mfg. Co.

Lightning Arresters.
General Electric Supply Corp.

Line Material.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Lock Nuts—(See Nut Locks)

Locomotive Jacket Sheets.
Armco Railroad Sales Co.

Locomotive Water Conditioners
Bird-Archer Co., The.

Locomotives, Contractors.
American Locomotive Co.
Baldwin Locomotive Works.
Lima Locomotive Works.

Locomotives, Electric.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Lima Locomotive Works
Westinghouse Elec. & Mfg. Co.

Locomotives, Gasoline.
Baldwin Locomotive Works.
Lima Locomotive Works

Locomotives, Gas-Electric.
Brill Co., The J. G.
Electro-Motive Co.

Locomotives, Geared.
Lima Locomotive Works.

Locomotives, Industrial.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Lima Locomotive Works.
Westinghouse Elec. & Mfg. Co.

Locomotives, Mine.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Lima Locomotive Works.
Westinghouse Elec. & Mfg Co.

Locomotives, Oil Engine, Electric Driven.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co.
Whitcomb Co., Geo. D. The.

Locomotives, Rebuilt.
American Locomotive Co.
Locomotives, Repair Parts.
American Locomotive Co.
Baldwin Locomotive Works.
Lima Locomotive Works.
Locomotives, Steam.
American Locomotive Co.
Baldwin Locomotive Works.
Lima Locomotive Works.
Locomotive Stokers.
Standard Stoker Co.
Locomotive Valve Pilot.
Valve Pilot Co.
Lubricators, Driving Box.
Franklin Railway Supply Co., Inc.
Lubricators, Piston Rod.
Q & C Co., The.
Lumber, Asbestos.
Carey & Co., Philip, The.
Johns-Manville Corp.
Lumber, Treated.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
Industrial Lumber & Creosoting Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.
Machinery, Hydraulic.
Birdsboro Steel Foundry & Mach. Co.
Machine Screws, Monel Metal
International Nickel Co., The.
Magnets, Lifting.
Industrial Brownhoist Corp.
Electro Metallurgical Sales Corp.
Mechanical Draft Apparatus—(See Heating and Vent. App.).
Mechanical Stokers.
Standard Stoker Co.
Melters, Snow, Electric.
Q & C Co., The.
Metallic Flexible Conduit.
General Electric Supply Corp.
Meters, Water & Oil.
Worthington Pump & Machinery Corp.
Milling Machines, Planer Type.
Sellers & Co., Inc., Wm.
Milling Machines, Plain and Universal.
Ryerson & Son, Joseph T.
Milling Machines, Portable Frame Jaw.
Micro Machine Co.
Mohair Upholstery Velvets.
Chase & Co., L. C.
Massachusetts Mohair Plush Co.
Molybdenum Metal.
Vanadium Corp. of America.
Monel Metal, Rods, Sheets, Tubes, Wire, etc.
International Nickel Co., The.
Motors, Electric.
Fairbanks-Morse & Co.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.
Motors & Generators.
Fairbanks-Morse & Co.
Moulding.
Aluminum Co. of America.
Multiple V Belt Drives.
Worthington Pump & Machinery Corp.
Nails.
American Steel & Wire Co.
Reading Iron Co.
Ryerson & Son, Joseph T.
Nipples, Air Hose.
Prime Manufacturing Co.
Nozzles, Exhaust.
Franklin Railway Supply Co., Inc.
Nozzles, Oxy-Acetylene Cutting.
Oxweld Railroad Service Co., The.
Nuts—(See Bolts and Nuts).
Nut Locks.
Dardelet Threadlock Corp.
Grip Nut Co.
Nuts, Tank Hose.
Prime Manufacturing Co., The.
Office Appliances.
Remington-Rand Business Service.
Oils, Diesel Engine
Vacuum Oil Co.
Oil, Dynamo
Vacuum Oil Co.
Oil-Electric Locomotives.
American Locomotive Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co.
Oil Filtering & Storage Systems.
Graver Tank & Mfg. Corp.
Oils & Greases, Engine
Vacuum Oil Co.
Oils & Greases, Lubricating
Vacuum Oil Co.
Oils & Greases, Motor
Vacuum Oil Co.
Oil, Linseed.
National Lead Co.
Oils, Locomotive Valve
Vacuum Oil Co.
Oil Plugs, Steam Chest.
Franklin Railway Supply Co., Inc.
Oil, Turbine
Vacuum Oil Co.
Oxy-Acetylene Apparatus.
Oxweld Railroad Service Co., The.
Oxygen.
Oxweld Railroad Service Co., The.
Packing.
Westinghouse Air Brake Co.
Packing, Air Pump.
Johns-Manville Corp.
Pilot Packing Co.
Union Asbestos & Rubber Co.
Westinghouse Air Brake Co.
Packing, Asbestos.
Packing, Cylinder and Valve Ring.
Johns-Manville Corp.
Hunt-Spiller Mfg. Corp.
Locomotive Finished Material Co.
Westinghouse Air Brake Co.
Packing, Locomotive Cab Cock.
Johns-Manville Corp.
Union Asbestos & Rubber Co.
Packing, Ring Boiler.
Union Asbestos & Rubber Co.
Packing, Semi-Metallic.
Pilot Packing Co.
Central Alloy Steel Corp.
Packing, Sheet.
Johns-Manville Corp.
Union Asbestos & Rubber Co.
Packing, Soft.
Carey & Co., Philip, The.
Johns-Manville Corp.
Pilot Packing Co.
Union Asbestos & Rubber Co.
Packing, Throttle.
Johns-Manville Corp.
Union Asbestos & Rubber Co.
Paint Burners, Acetylene.
Oxweld Railroad Service Co., The.
Paint, Metal Protective.
Lowe Bros. Co., The.
National Lead Co.
Sherwin-Williams Co.
Paint, Powder.
Aluminum Co. of America
Paint Spraying Equipment.
De Vilbiss Mfg Co., The.
Paints.
Lowe Bros. Co., The.
National Lead Co.
Sherwin-Williams Co.
Paper, Carbon.
Remington-Rand Business Service.
Paper, Sheathing.
Carey & Co., Philip, The
Patterns, for Iron, Steel & Brass Castings.
Baldwin Locomotive Works, The.
Pavement Breakers.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.
Pickling Equipment, Monel Metal.
International Nickel Co., The.
Pile Drivers.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.
Piling, Treated.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Piling, Sheet Steel.
American Bridge Co.
Carnegie Steel Co.
Inland Steel Company
Piling, Wood.
National Lumber & Creosoting Co.
Pilot Beams, Cast Steel.
General Steel Castings Corp.
Gould Coupler Co., The.
Pilots, Cast Steel.
General Steel Castings Corp.
Locomotive Finished Material Co.
Pins, Air Brake & Clevis.
Champion Rivet Co.
Pins, Center.
Miner, W. H.
Pins, Coupler Knuckle.
Champion Rivet Co.
McConway & Torley Co.
National Malleable & Steel Castings Co.
Pins, Crank.
American Locomotive Co.
Baldwin Locomotive Works.
Miner, Inc., W. H.
Standard Steel Works Co.
Union Asbestos & Rubber Corp.
Pipe, Corrugated Iron
Armco Culvert Manufacturers Association
Pipe, Paved Invert
Armco Culvert Manufacturers Association
Pipe Coverings.
Carey & Co., Philip, The.
Johns-Manville Corp.
Keasby & Mattison Co.
Pipe Fittings—(See Fittings, Pipe).
Pipe, Metal Culvert.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Republic Steel Corp.
Pipe, Perforated Iron
Armco Culvert Manufacturers Association
Pipe, Spiral Welded.
Armco Railroad Sales Co
Pipe, Steel Signal.
National Tube Co.
Pipe, Spiral Welded.
Armco Railroad Sales Co.
Pipe, Wrought Iron.
Byers Co., A. M.
Reading Iron Co.
Planers, Plate.
Ryerson & Son, Jos. T.
Sellers & Co., Inc., Wm.
Plates.
Steel Car Forge Co.
Plates, Follower.
Steel Car Forge Co.
Plates, Boiler, Firebox—(See Steel Firebox).
Plates, Center—(See Bearings, Center).
Plates, Iron & Steel.
Armco Railroad Sales Co.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.
Plate & Sheet Metal Work.
Baldwin Locomotive Works, The.
Plates, Tie.
Illinois Steel Co.
Inland Steel Company.
Railroad Supply Co.
Tennessee Coal, Iron & Railroad Co.
Plates, Tin and Terne.
American Sheet & Tin Plate Co.
Platforms, Car.
Gould Coupler Co., The.
Standard Coupler Co.
Platforms, Cast Steel, Passenger Car.
General Steel Castings Corp.
Plows, Railroad and Grading.
Western Wheeled Scraper Co.
Plows, Snow.
American Locomotive Co.
Brill Co., The J. G.
Q & C Co., The.
Plush, Mohair.
Chase & Co., L. C.
Massachusetts Mohair Plush Co.
Pneumatic Tools.
Ingersoll-Rand Co.
Poles, Creosoted.
National Lumber & Creosoting Co.
Poles, Power Distribution.
National Lumber & Creosoting Co.
Poles, Preservatively Treated.
National Lumber & Creosoting Co.
Poles, Signal.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
General Railway Signal Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.
Union Switch & Signal Co.
Poles, Steel Tubular.
Graybar Electric Co.
National Tube Co.
Poles, Telegraph.
National Lumber & Creosoting Co.
Poles, Transmission.
National Lumber & Creosoting Co.
Poles, Treated.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
General Electric Supply Corp.
Curtin-Howe Corp.
Graybar Electric Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.
Poles, Wood
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Posts, Farm.
National Lumber & Creosoting Co.
Posts, Fence, Treated.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
Inland Steel Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.
Posts, Highway.
National Lumber & Creosoting Co.
Posts, Steel Fence.
American Steel & Wire Co.
Q & C Co., The.
Posts, Wood.
National Lumber & Creosoting Co.
Powder, Blasting—(See Explosives).
Powdered Coal Equipment.
Muhlfeld, John E.
Power Plants.
General Electric Co.
Muhlfeld, John E.
United Engineers & Constructors, Inc.
Westinghouse Elec. & Mfg. Co.
Power Transmission Supplies.
Sellers & Co., Inc., Wm.
Preservatives, Wood.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
National Lumber & Creosoting Co.
Presses, Flanging Hydraulic.
Birdsboro Steel Foundry & Machine Co.
Presses, Hydraulic.
Baldwin-Southwark Corp.
Birdsboro Steel Foundry & Machine Co.
Presses, Wheel.
Birdsboro Steel Foundry & Machine Co.
Sellers & Co., Inc., Wm.
Pulverizers, Coal — (See Crushers, Coal).
Pumping Stations.
Fairbanks-Morse & Co.
Pump Liners, Monel Metal.
International Nickel Co., The.
Pump Rods, Monel Metal.
International Nickel Co., The.
Pump Shafts, Monel Metal.
International Nickel Co., The.
Pumps, Hydraulic.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.
Pumps & Pumping Mchy.
Fairbanks-Morse & Co.
Ingersoll-Rand Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.
Poles, Creosoted.
National Lumber & Creosoting Co.
Pumps, Vacuum.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.
Punching and Shearing Machines.
Ryerson & Son, Joseph T
Pushers, Coal.
Standard Stoker Co.
Pyrometers, Superheated Steam.
Superheater Co., The.
Rail Anchors.
Bethlehem Steel Co.
P. & M. Co., The.
Rail-Bonds.
American Steel & Wire Co
General Electric Co.
General Railway Signal Co.
Graybar Electric Co.
Railroad Supply Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.
Rail Braces — (See Braces, Rail).
Rail Reclamation Equipment.
Ryerson & Son, Joseph T.
Railroad Shops.
United Engineers & Constructors, Inc.
Railroad Structures — (See Engineers and Contractors: also Building
Rail Splice Plates — (See Joints, Rail)
Rails.
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Inc., Joseph T.
Tennessee Coal, Iron & Railroad Co.
Thomson Rail Corp.
Railway Signals.
General Electric Supply Corp.
Rattan.
Hale-Kilburn Co.
Heywood-Wakefield Co.
Receivers, Air.
Ingersoll-Rand Co.
Westinghouse Air Brake Co.
Recorders, Speed & Cut-off.
Valve Pilot Co.
Rectifiers for Signal Work
General Electric Co.
Railroad Supply Co.
Union Switch & Signal Co
Reducing Valves.
Vapor Car Heating Co., Inc.
Reflectors, Headlight.
Pyle-National Co., The
Sunbeam Electric Mfg. Co
Refrigerators.
Wine Railway Appliance Co.
Regulators, Oxy-Acetylene.
Oxweld Railroad Service Co., The.

Relays.
General Railway Signal Co.
Railroad Supply Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Removers, Paint & Varnish.
Oakite Products, Inc.

Repair Parts, Stoker.
Standard Stoker Co.
Q & C Company, The.

Retorts, Creosoting.
Graver Tank & Mfg. Corp.

Reverse Gear, Power.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Rivet Cutters.
Ingersoll-Rand Co.

Riveters, Hydraulic.
Birdsboro Steel Foundry & Machine Co.

Riveting Machines.
Ingersoll-Rand Co.

Rivets.
Inland Steel Co.
Neely Nut & Bolt Co.
Ryerson & Son, Joseph T.
Pressed Steel Car Co.
Russell, Burdsall & Ward Bolt and Nut Co.

Rods.
Neely Nut & Bolt Co

Rolled Steel.
Carnegie Steel Co.

Roller Bearings—(See Bearings, Roller).

Rolls, Bending & Straightening.
Birdsboro Steel Foundry & Machine Co.

Roof Slabs, Concrete.
Federal American Cement Tile Co.

Roofing, Asbestos.
Carey & Co., Philip, The.
Johns-Manville Corp.
Lehon Co., The.

Roofing, Buildings.
Armco Railroad Sales Co.
Carey Co., Philip, The.
Lehon Co., The.
Johns-Manville Corp.
Superior Sheet Steel Co., The (Division of Continental Steel Corp.).

Roofing, Car.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Carey & Co., Philip, The.
Hutchins Car Rfg. Co.
Johns-Manville Corp.
Lehon Co., The.
Superior Sheet Steel Co., The (Division of Continental Steel Corp.).
Tuco Products Corp.
Union Metal Products Co

Roofing, Corrugated.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Carey Co., Philip, The
Johns-Manville Corp.

Roofing, Tile.
Federal American Cement Tile Co.

Roofing, Tile, Cement.
Federal American Cement Tile Co.

Roofing, Tin.
American Sheet & Tin Plate Co.

Rope, Wire — (See Wire Rope).

Rust Preventatives.
Dearborn Chemical Co.
Oakite Products, Inc.

Safe Ends.
National Tube Co.

Sand Drying Plants.
Roberts & Schaefer Co.

Sanitary Products.
West Disinfecting Co.

Sash Balances.
Tuco Products Co.

Saws, Circular Metal.
Ryerson & Son, Joseph T.

Saws, High Speed, Friction.
Ryerson & Son, Joseph T.

Saws, Portable Rail.
Industrial Brownhoist Corp.
Q & C Co., The.

Scales.
Fairbanks-Morse & Co.

Scrapers, Wheeled and Drag.
Western Wheeled Scraper Co.

Screens, Passenger Car.
Tuco Products Corp.

Seats, Car.
Brill Co., The J. G.
Hale-Kilburn Co.
Heywood-Wakefield Co.

Seats, Coach.
Brill Co., The J. G.

Shafting.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.
Sellers & Co., Inc., Wm.
Standard Steel Works Co.

Shapers.
Ryerson & Son, Joseph T.

Shapes, Pressed Steel.
Pressed Steel Car Co.
Sellers & Co., Inc., Wm.

Shapes, Structural.
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

Sheds, Train.
American Bridge Co.
Inland Steel Co.

Sheets, Black and Galvanized.
Allegheny Steel Co.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Inland Steel Co.
Republic Steel Corp.
Ryerson & Son, Joseph T.

Sheets, Blue Annealed.
Allegheny Steel Co.

Sheets, Building, Special Car, Corrugated & Plain.
Armco Railroad Sales Co.

Sheets, Corrugated.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Carey Co., Philip, The.
Carnegie Steel Co.
Johns-Manville Corp.
Ryerson & Son, Joseph T.

Sheets, Corrugated & Plain.
Inland Steel Co.
Ryerson & Son, Joseph T.

Sheets, Electrical.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Republic Steel Corp.
Ryerson & Son, Joseph T.

Sheets, Iron & Steel.
Armco Railroad Sales Co.
Bethlehem Steel Co.
Superior Sheet Steel Co., The (Division of Continental Steel Corp.).

Sheets, Locomotive Jacket.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Inland Steel Co.
Ryerson & Son, Inc., Joseph T.

Sheets, Polished or Planished Iron.
Armco Railroad Sales Co
American Sheet & Tin Plate Co.

Sheets, Steel.
Armco Railroad Sales Co
Inland Steel Co.
Ryerson & Son, Joseph T

Sherardising Plants.
General Electric Co.

Shop Calling Systems—(See Systems, Communication).

Shops, Railroad—(See Buildings, Iron, Steel and Steel Concrete).

Shovels & Draglines.
Industrial Brownhoist Corp.

Shovels, Steam, Gasoline & Electric.
Orton Crane & Shovel Co.

Siding, Iron & Steel.
Armco Railroad Sales Co.

Siding., Bldg., Car, Corrugated & Plain.
Kinnear Mfg. Co.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Inland Steel Co.
Ryerson & Son, Inc., Joseph T.

Siding, Corrugated & Plain.
Carey & Co., Philip, The.
Johns-Manville Corp.

Signal Accessories.
Electric Storage Battery Co.
General Electric Co.
General Railway Signal Co.
Graybar Electric Co.
Railroad Supply Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Signals, Automatic Cab.
General Railway Signal Co.
Union Switch & Signal Co.

Signal Blades.
General Railway Signal Co.
Union Switch & Signal Co

Signals, Crossing.
Union Switch & Signal Co.

Signals, Crossing Protection.
General Railway Signal Co.
Railroad Supply Co.

Signals, Railway.
General Electric Co.
Union Switch & Signal Co.

Sign Posts, Treated.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
National Lumber & Creosoting Co.

Signs, Highway Crossing.
Railroad Supply Co.

Silico Manganese.
Vanadium Corp. of America.

Slabs, Concrete Floor.
Federal Cement Tile Co.

Slag, Blast Furnace.
Carnegie Steel Co.

Slotting Machines.
Sellers & Co., Inc., Wm.

Slotting Machines, Locomotive Cylinder.
American Steel & Wire Co.

Sludge Removers.
Bird-Archer Co., The.

Soap, Liquid.
West Disinfecting Co.

Solder.
National Bearing Metals Corp.
Ryerson & Son, Inc., Joseph T.
Westinghouse Elec. & Mfg. Co.

Spark Arresters.
Locomotive Firebox Co.

Speed Indicators & Recorders.
Valve Pilot Corp.

Spelter—(See Zinc).

Spikes.
American Steel & Wire Co.
Bethlehem Steel Co.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

Splice Bars, Angle.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.

Spring Plates or Seats.
Allegheny Steel Co.
National Malleable & Steel Castings Co.
Union Spring & Mfg. Co.

Springs.
American Steel Foundries Co.
American Steel & Wire Co
Baldwin Locomotive Works, The.
Pittsburgh Spring & Steel Co.
Railway Steel Spring Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.
Union Switch & Signal Co.

Springs, Shop Equipment.
Ryerson & Son, Joseph T.

Springs, Vanadium Steel.
Pittsburgh Spring & Steel Co.
Union Spring & Mfg. Co.

Stacks, Steel.
American Bridge Co.
Graver Tank & Mfg. Corp.

Stands, Switch & Target.
Q & C Co., The.

Staybolts.
American Locomotive Co.
Ewald Iron Co.
Ryerson & Son, Joseph T.

Staybolts, Hollow.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.

Steam Chests.
Franklin Railway Supply Co., Inc.

Steam Enclosures, Corrugated Iron.
Republic Steel Corp.

Steam Shovels.
Orton Crane & Shovel Co.

Steel Alloy.
Illinois Steel Co.
Ryerson & Son, Joseph T.
Republic Steel Corp.
Standard Steel Works Co.

Steel, Firebox.
Carnegie Steel Co.
Illinois Steel Co.

Steel & Iron, Stainless.
Allegheny Steel Co.

Steel, Open Hearth.
Carnegie Steel Co.
Illinois Steel Co.

Steel Plate Construction.
Graver Tank & Mfg. Corp.

Steel, Pressed Specialties.
Hale-Kilburn Co.

Steel, Structural.
American Bridge Co.
Carnegie Steel Co.
Graver Tank & Mfg. Corp.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

Steel, Tool.
Illinois Steel Co.
Midvale Co., The.
Q & C Co., The.
Ryerson & Son, Joseph T.

Step Joints.
Q & C Co., The.
Rail Joint Co.

Steps, Car—(See Car Steps, Safety).

Stokers, Locomotive.
Lower Stoker Co.
Standard Stoker Co.

Stokers, Mechanical.
Westinghouse Elec. & Mfg. Co.

Stoker Repair Parts.
Lower Stoker Co.
Standard Stoker Co.

Storm Sewers, Corrugated Iron.
Republic Steel Corp.

Strainer, Air.
Westinghouse Air Brake Co.

Strainers, Tank Hose.
Prime Mfg. Co., The.

Stringers, Bridge, Treated.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Structural Shapes, Rolled Shapes.
Carnegie Steel Co.

Superheaters.
Superheater Co., The.

Supports, Bottom Rod Safety.
Chicago Railway Equipment Co.

Switch Boards.
Graybar Electric Co.
Johns-Manville Corp.
Westinghouse Elec. & Mfg. Co.

Switch Machines.
General Railway Signal Co.

Switch Movements.
Union Switch & Signal Co.

Switch Ties, Treated.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Switches, Electric.
Electric Service Supplies Co.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Switches & Switch Stands.
Ramapo Ajax Corp.

Syphons, Corrugated Iron.
Republic Steel Corp.

Syphons, Locomotive.
Locomotive Firebox Co.

Syphons, Locomotive, Boilers
Locomotive Firebox Co.

Tables, Welding.
Oxweld Railroad Service Co., The.

Tables, Welding.
Oxweld Railroad Service Co., The.

Tamping Machines, Tie.
Ingersoll-Rand Co.

Tamping Outfits, Tie.
Ingersoll-Rand Co.

Tank Cars.
General American Tank Car Corp., The.

Tanks, Acetylene, Gas.
Oxweld Railroad Service Co., The.

Tanks, Air, Gas, Oil and Water.
Baldwin Locomotive Works, The.
Graver Tank & Mfg. Corp.

Tanks, Water.
American Bridge Co.
American Locomotive Co.
National Tube Co.
Pressed Steel Car Co.
Westinghouse Air Brake Co.

Tape, Insulation.
Johns-Manville Corp.
Westinghouse Elec. & Mfg. Co.

Taps, Staybolt.
Ryerson & Son, Joseph T.

Tele. & Tele. Wire.
American Steel & Wire Co.
Anaconda Wire & Cable Co.
General Electric Supply Corp.

Terminals, Railroad.
United Engineers & Constructors, Inc.

Testers, Boiler.
Sellers & Co., Inc., Wm.

Testers, Gage.
Ashton Valve Co.

Testers, Rail.
Sperry Products, Inc.

Testers, Staybolt.
Flannery Bolt Co.

Testing Machines.
Baldwin-Southwark Corp

Thermostats.
Gold Car Heating & Lighting Co.
Vapor Car Heating Co. Inc.

Tie Plates.
Bethlehem Steel Co.
Illinois Steel Co.
Inland Steel Company
Railroad Supply Co.

Ties, Creosoted.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Ties, Steel.
American Bridge Co.
Bethlehem Steel Co.
Carnegie Steel Co.

Ties, Treated.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Tile, Cement, Concrete.
Federal American Cement Tile Co.

Timbers, Pre-framed, Treated
National Lumber & Creosoting Co.

Timber, Treated.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.
Wood Conversion Co.

Tires.
Firestone Tire & Rubber Co.
General Tire & Rubber Co.
Goodyear Tire & Rubber Co.
Goodrich Rubber Co., B. F.

Tires, Steel.
Edgewater Steel Co.
Midvale Co., The.
Railway Steel Spring Co.
Standard Steel Works Co.

Toilet Papers
U. S. Envelope Co.

Tools, High Speed Steel.
Bethlehem Steel Co.
Bird-Archer Co., The.

Towers, Floodlight.
Pyle-National Co.

Track Skates.
Q & C Co., The.

Tractors.
Caterpillar Tractor Co.
Elwell-Parker Electric Co.
Industrial Lumber Co.
International Creosoting & Construction Co.

Tractors, Industrial.
Elwell-Parker Electric Co.
International Harvester Co.

Tractors, Turntable.
Nichols & Bro., Geo. P.

Train Control Systems.
General Railway Signal Co.
Union Switch & Signal Co.

Tramways, Wire Rope.
American Steel & Wire Co.

Transfer Tables.
American Bridge Co.
Industrial Brownhoist Corp.
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Railroad Supply Co.
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Edwards Co., O. M.

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Tuco Products Corp.

Traps, Steam.
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Treads, Safety.
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American Steel Foundries.
Baldwin Locomotive Works.
Bettendorf Company, The.
Birdsboro Steel Foundry & Machine Co.
Brill Co., The J. G.
Flexible Truck Co.
Franklin Railway Supply Co., Inc.
Gould Coupler Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Standard Car Truck Co.
Symington Co., The.

Trucks, Cast Steel Tender.
General Steel Castings Corp.

Trucks, Cast Steel, Electric Car.
General Steel Castings Corp.

Trucks, Cast Steel, Car and Locomotive.
General Steel Castings Corp.

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Elwell-Parker Electric Co.

Trucks, Industrial.
Elwell-Parker Electric Co.

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General Motors Truck Co.
International Harvester Co.
Reo Motor Car Co.
White Co., The.

Trucks, Tender.
Flexible Truck Co.

Trucks, Trailer.
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Tubes, Arch.
National Tube Co.

Tubes, Boiler.
Allegheny Steel Co.
Armco Railroad Sales Co.
Bethlehem Steel Co.
Globe Steel Tubes Co.
National Tube Co.
Ryerson & Son, Joseph T.

Tubes, Boiler, Charcoal Iron.
Bethlehem Steel Co.
Reading Iron Co.

Tubes, Staybolt.
Falls Hollow Staybolt Co.

Tubes, Tire.
Firestone Tire & Rubber Co.
Goodyear Tire & Rubber Co.

Tubing.
Aluminum Co. of America.

Tubing, Seamless Steel.
National Tube Co.

Tungsten Metal.
Vanadium Corp. of America.

Turbo Generators.
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General Electric Co.
Pyle-National Co.
Sunbeam Electric Mfg. Co
Westinghouse Elec. & Mfg Co.

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American Steel & Wire Co
Ryerson & Son, Joseph T.

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Nichols & Bro., Geo. P.

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Remington-Rand Business Service.

Typewriters.
Remington-Rand Business Service.

Uncoupling Device.
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Undercrossings, Corrugated Iron.
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Underfloor Duct.
General Electric Supply Corp.

Underfloor Duct, Fibre and Metal.
Johns-Manville Corp.

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Underframes, Cast Steel, Freight Car.
General Steel Castings Corp.

Underframes, Steel.
Bettendorf Co., The.
Brill Co., The J. G.
Pressed Steel Car Co.
St. Louis Car Co.

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Pantasote Co., The

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Pyle-National Co.

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Westinghouse Air Brake Co.

Valves, Back Pressure Acetylene.
Oxweld Railroad Service Co., The.

Valves, Blow-Off.
Bird-Archer Co., The.

Valves, Check & Angle Steam
Sellers & Co., Inc., Wm.

Valves, Drifting.
Ardco Mfg. Co.
Sellers & Co., Inc., Wm.

Valves, Hydraulic.
Birdsboro Steel Foundry & Machine Co.

Valves, Piston.
Franklin Railway Supply Co., Inc.

Valves, Pop, Safety & Relief.
Ashton Valve Co.
Vapor Car Heating Co., Inc.
Westinghouse Air Brake Co.

Valves, Pressure Regulating.
Gold Car Heating & Lighting Co.

Valves, Throttle.
American Throttle Co., Inc.
Bradford Corporation.

Valves, Fire.
Schrader's Son, Inc., A.

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Aluminum Co. of America.

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Sherwin-Williams Co.
Vapor Car Heating Co. Inc.
Wine Railway Appliance Co.

Ventilators, Car.
Gold Car Heating & Lighting Co.

Ventilators, Shop & Roundhouse.
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National Malleable & Steel Castings Co.
Ryerson & Son, Joseph T.
Wine Railway Appliance Co.

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Sellers & Co., Inc., Wm.

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Johns-Manville Corp.
Lehon Co., The.

Water Purifying Materials & Compounds.
Bird-Archer Co., The.
Dearborn Chemical Co.

Water Softening & Purifying.
Bird-Archer Co., The.
Dearborn Chemical Co.
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Permutit Co., The.

Weather Stripping.
Tuco Products Corp.

Wedges, Automatic.
Franklin Railway Supply Co., Inc.

Wedges, Journal Box.
American Steel Foundries.
Gould Coupler Co.
National Malleable & Steel Castings Co.
Pressed Steel Car Co.
Symington Co., The.

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Electric Railweld Service Corp.

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Oxweld Railroad Service Co., The.
Ryerson & Son, Joseph T.
Westinghouse Elec. & Mfg Co.

Welding Machines, Electric.
General Electric Co.
Ryerson & Son, Joseph T.

Welding Machines, Flue.
Ryerson & Son, Joseph T

Welding Materials.
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Franklin Railway Supply Co., Inc.

Welding Process.
Oxweld Railroad Service Co.

Welding Rods.
American Steel & Wire Co
General Electric Supply Corp.
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American Locomotive Co.
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Edgewater Steel Co.
Hunt-Spiller Mfg. Corp.
Standard Steel Works Co.
Union Steel Casting Co.

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American Steel Foundries.
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Carnegie Steel Co.
Edgewater Steel Co.
Griffin Wheel Co.
Illinois Steel Co.
Mt. Vernon Car Mfg. Co
Pressed Steel Car Co.
Railway Steel Spring Co.
Standard Steel Works Co

Wheels, Cast Iron, Chilled Tread.
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Griffin Wheel Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.

Wheels, Mine Car.
Carnegie Steel Co.
Edgewater Steel Co.
Griffin Wheel Co.
Mt. Vernon Car Mfg. Co.
Standard Steel Works Co.

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Carnegie Steel Co.
Illinois Steel Co.
Edgewater Steel Co.
Griffin Wheel Co.
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Carnegie Steel Co.
Edgewater Steel Co.
Illinois Steel Co.
Lima Locomotive Works.
Railway Steel Spring Co.
Standard Steel Works Co.

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Armco Railroad Sales Co.
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Edgewater Steel Co.
Standard Steel Works Co

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Kerite Insulated Wire & Cable Co.

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American Steel & Wire Co.

Wire, Insulated.
American Steel & Wire Co
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General Electric Co.
Graybar Electric Co.
Kerite Insulated Wire & Cable Co.

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American Steel & Wire Co
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American Steel & Wire Co.

Wire Rope.
American Steel & Wire Co

Wire, Telephone & Telegraph
American Steel & Wire Co
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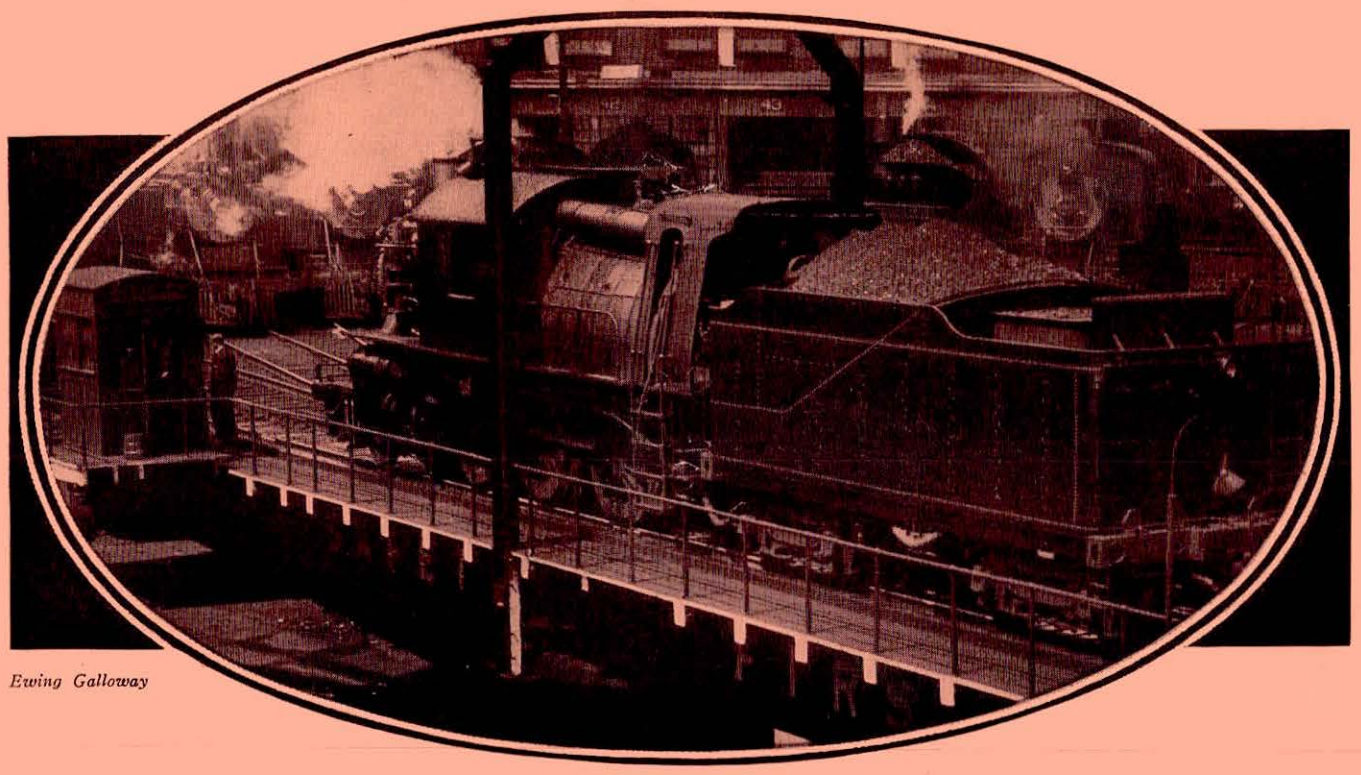

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Rolled
Wheels
Steel Tired
Wheels
Forgings
Steel
Castings
Billets

EITHER returning to the round house after a hard run or just starting out, the locomotive equipped with ''Standard'' Forgings and "Standard" Q.T. wheels is ready for service. It is apt to spend fewer days in the repair shops and more days in service than it would otherwise. Specify "Standard" parts for the maximum relief from maintenance.

STANDARD STEEL WORKS COMPANY

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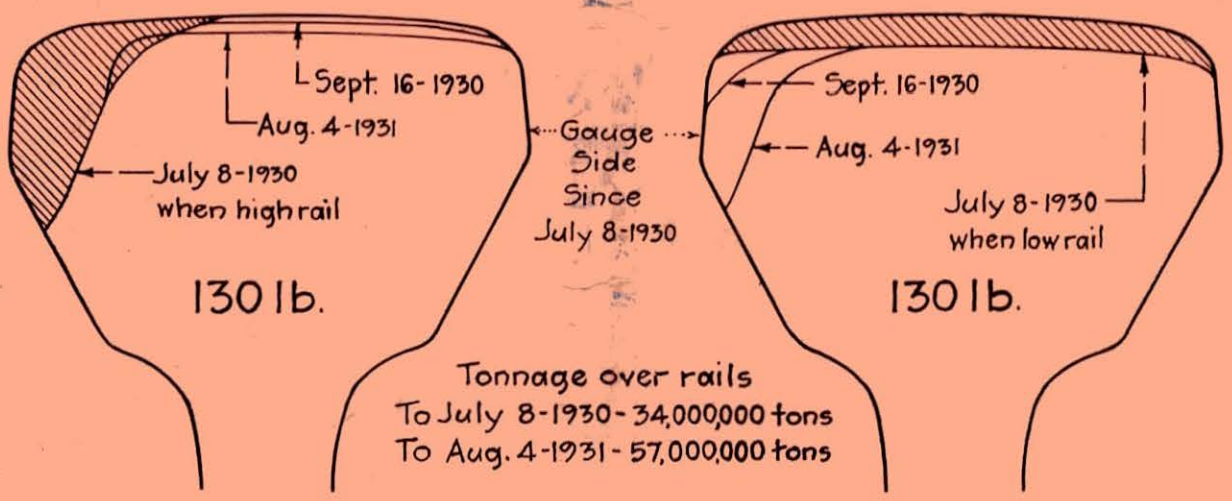
Akron Portland San Francisco

Headfree Rail

Transposition Test



High Rail Apr. 1-1929
to July 8-1930
Then transferred to Low Side

Low Rail Apr. 1-1929
to July 8-1930
Then transferred to High Side

The 130 lb. head free rails shown in above sections were laid Apr. 1, 1929 on both high and low sides of a 10°-30' curve. They remained in track as originally laid until July 8, 1930-when the low side rails were removed and placed on the high side, and likewise the high rails changed to the low side. The amount of abrasion from the original Rails up to time of transposition is shown by the shaded area. The lines of wear taken since transposition are indicated by light lines and the dates shown. Headfree rails on other tests, under similar conditions are giving about 2½ years service or a possible 75% longer life than standard section rails.

By making this transposition on heavy curves at a time when wear on the low Headfree rail has about reached the height of new Standard rail, it is felt that with the low rail changed to high rail and presenting a full side head, and the high side rail of nearly full height used on low side, it will add at least one additional year to the total life of the rail. This additional life might well be termed, "The Second Life of Headfree Rail."

This test will be continued to completion and actual figures and history will be given, when the rail reaches its limit of wear. —

THE THOMSON RAIL CORPORATION
OF NEW YORK
Pennsylvania Building — Philadelphia
Engineering Materials Limited, Mc Gill Bldg., Montreal, Que.

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